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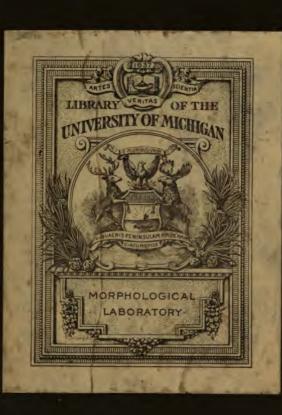
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STATISTICAL METHODS

WITH SPECIAL REFERENCE TO

84868

BIOLOGICAL VARIATION.

C. B. DAVENPORT, Ph.D.,
Instructor in Zoology at Harvard University.

FIRST EDITION.

FIRST THOUSAND.

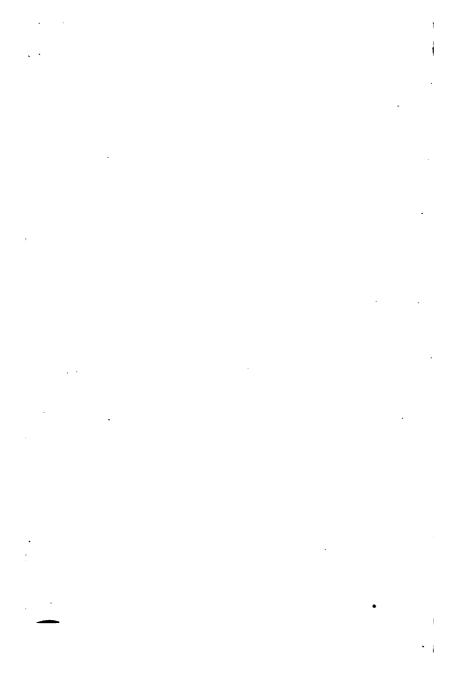
NEW YORK:
JOHN WILEY & SONS.
London: CHAPMAN & HALL, Limited.
1899.

Copyright, 1899, BY C. B. DAVENPORT. This book has been issued in answer to a repeated call for a simple presentation of the newer statistical methods in their application to biology. The immediate need which has called it forth is that of a handbook containing the working formulæ for use at summer laboratories where material for variation-study abounds. In order that the book should not be too bulky the text has been condensed as much as is consistent with clearness.

This book was already in rough draft when the work of Duncker appeared in Roux's Archiv. I have made much use of Duncker's paper, especially in Chapter IV. I am indebted to Dr. Frederick H. Safford, Assistant Professor of Mathematics at the University of Cincinnati and formerly Instructor at Harvard University. for kindly reading the proofs and for valuable advice. To Messrs. Keuffel and Esser, of New York, I am indebted for the use of the electrotypes of Figures 1 and 2. Finally, I cannot fail to acknowledge the cordial coöperation which the publishers have given in making the book serviceable.

C. B. DAVENPORT.

BIOLOGICAL LABORATORY OF THE BROOKLYN INSTITUTE, COLD SPRING HARBOR, LONG ISLAND, June 29, 1899.



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STATISTICAL METHODS

WITH SPECIAL REFERENCE TO

BIOLOGICAL VARIATION.

CHAPTER I.

ON METHODS OF MEASURING ORGANISMS.

Preliminary Definitions.

An individual is a segregated mass of living matter, capable of independent existence. Individuals are either simple or compound, i.e., stocks and corms. In the case of a compound individual the morphological unit may be called a person.

A character is any quality common to a number of individuals.

The magnitude of a character is a quantitative expression of the character.

A variate is a single magnitude-determination of a character.

A class includes variates of the same or nearly the same magnitude.

Integral variates are magnitude-determinations of characters which from their nature are expressed in integers. Such magnitudes are determined by counting; e.g., the number of teeth in a porpoise.

Graduated variates are magnitude-determinations of characters which do not exist as integers and which may conse-

quently differ in different individuals by any degree of magnitude however small; e g., the stature of man.

Methods of Collecting Individuals for Measurement.

In collecting a lot of individuals for the study of the variability of any character undue selection must be avoided. The rule is:

Having settled upon the general conditions, of race, sex, locality, etc., which the individuals to be measured must fulfil, take the individuals methodically at random and without possible selection of individuals on the basis of the magnitude of the character to be measured. If the individuals are simply not consciously selected on the basis of magnitude of the character they will often be taken sufficiently at random.

Processes Preliminary to Measuring Characters.

Some characters can best be measured directly; e.g., the stature of a race of men. Often the character can be better studied by reproducing it on paper. The two principal methods of reproducing are by photography and by camera drawings.

For photographic reproductions the organs to be measured will be differently treated according as they are opaque or transparent. Opaque organs should be arranged if possible in large series on a suitable opaque or transparent background. The prints should be made on a rough paper so that they can be written on; blue-print paper is excellent. This method is applicable to hard parts which may be studied dry; e.g., mollusc shells, echinoderms, various large arthropods, epidermal markings of vertebrates and parts of the vertebrate skeleton. Shadow photographs may be made of the outlines of opaque objects, such as birds' bills, birds' eggs, and butterfly wings, by using parallel rays of light and interposing the object between the source of light and the photo-

^{*} A Welsbach burner or an electric light are especially good. Minute

graphic paper. More or less transparent organs, such as leaves, petals, insect-wings, and appendages of the smaller Crustacea, may be reproduced either directly on blue-print paper or by "solar prints," either of natural size or greatly enlarged. For solar printing the objects should be mounted in series on glass plates. They may be fixed on the plate by means of balsam or albumen and mounted between plates either dry or in Canada balsam or other permanent mounting media. Wings of flies, orthoptera, neuroptera, etc., may be prepared for study in this way; twenty-five to one hundred sets of wings being photographed on one sheet of paper, say 16 × 20 inches in size. Microphotographs will sometimes be found serviceable in studying small organisms or organs, such as shells of Protozoa or cytological details.

Camera drawings are a convenient although slow method of reproducing on paper greatly enlarged outlines of microscopic characters, such as the form and markings of worms and lower Crustacea, sponge spicules, bristles, scales and scutes, plant-hairs, cells and other microscopic objects. In making such camera drawings a low-power objective, such as Zeiss A*, will often be found very useful.

The Determination of Integral Variates.— Methods of Counting.

While the counting of small numbers offers no special difficulty, the counting becomes more difficult with an increase of numbers. To count large numbers the general rule is to divide the field occupied by the numerous organs into many small fields each containing only a few organs. Counting under the microscope, e.g., the number of spines, scales or plant-hairs per square millimetre, may be aided by cross-hair rectangles in the eyepiece. The number of blood-corpuscles in a drop of blood, or of organisms in a cubic centimetre of water, have long been counted on glass slides ruled in small squares.

electric lamps such as are fed by a single cell give sharp shadows of small objects.

The Determination of Graduated Variates.— Methods of Measurement.

Straight lines on a plane surface are easily measured by means of a measuring-scale of some sort. The measured by means of a measuring-scale of some sort.



Fig. 1.

urement should always be metric because this is the universal scientific system. Various kinds of scales may be obtained of optical companies and hardware dealers.such as steel measuring tapes, graduated to millimetres (about \$1.00), and steel rules (6 cm. to 15 cm.) graduated to 1 of a millimetre. Steel "spring-bow" dividers with milled-head screw are useful for getting distances which may be laid off on a scale. Tortuous lines, e.g., the contour of the serrated margin of a leaf or the outer margin of the wing of a sphinx moth, may be measured by a map-measurer ("Entfernungsmesser," Fig. 1), supplied at artist's and engineer's supply stores at about \$3.50.

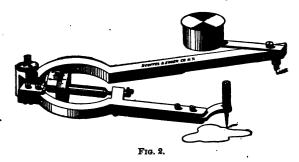
Distances through solid bodies or cavities are measured by calipers of some sort. Calipers for measuring diameters of solid bodies are made in various styles. Micrometer screw calipers ("speeded") reading to one-hundredths of a millimetre and sold by dealers in physical apparatus for

about \$5.00 are excellent for determining diameters of bones, birds' eggs, gastropod shells, etc. Leg calipers for rougher work can be obtained for from 30 cents to \$4.00. The micrometer "caliper-square," available for inside or outside measurements and measuring to hundredths of a millimetre, is a useful instrument.*

The area of plane surfaces, as, e.g., of a wing or leaf, is easily determined by means of a sheet of colloidin scratched in millimetre squares. By rubbing in a little carmine the

^{*} Many of the instruments described in this section are made by the Starrett Co., Athol, Mass., and by Brown and Sharpe, Providence, tool cutters.

scratches may be made clearer. The number of squares covered by the surface is counted (fractional squares being mentally summated) and the required area is at once obtained. If the area has been traced on paper it may be measured by the planimeter (Fig. 2). This instrument may be obtained at



engineer's supply shops. It consists of two steel arms hinged together at one end; the other end of one arm is fixed by a pin into the paper, the end of the second arm is provided with a tracer. By merely tracing the periphery of the figure whose area is to be determined the area may be read off from a drum which moves with the second arm. This method is less wearisome than the method of counting squares.

The area of a curved surface, like that of the elytra of a beetle or the shell of a clam, is not always easy to find. To get the area approximately, project the curved surface on a plane by making a camera drawing or photograph of its outline. By means of parallel lines divide the outline drawing into strips such that the corresponding parts of the curved surface are only slightly curved across the strips, but greatly curved lengthwise of the strips. Measure the length of each plane strip and divide the magnitude by the magnification of the drawing. Measure also, with a flexible scale, the length of the corresponding strip on the curved surface. Then, the area of any strip of the object is to the area of the projection as the length of the strip on the object is to the length of its projection. The sum of the areas of the strips will give the total area of the surface.

The form of a plane figure of irregular outline has been expressed qualitatively by botanists, who have invented a complicated nomenclature for the purpose; this is reproduced in part here.

Linear, more than thrice longer than wide and of nearly the same breadth throughout (Fig. 3).

Lanceolate, more than thrice longer than wide and tapering towards one or both ends (Fig. 4).

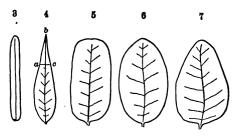
Oblong, twice to thrice as long as broad (Fig. 5).

Elliptical, of the shape of an ellipse with an eccentricity more than .5 (Fig. 6).

Oval, elliptical, with eccentricity from .5 to .1.

Orbicular, nearly circular, with eccentricity less than .1.

Ocate, with the outline of a hen's egg, one end broader than the other (Fig. 7).



Figs. 3-7.

Cuneate or cuneiform, wedge-shaped.

Spatulate, rounded at one end, long and narrow at the other, like a spatula.

Acuminate, tapering to an angle of less than 15° (Fig. 8).

Acute, ending in an angle of from 15° to 90° (Fig. 9).

Obtuse, ending in an angle of over 90° (Fig. 10). Truncate, terminating as though cut off (Fig. 11).

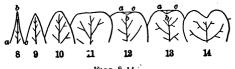
Retuse, with a re-entering obtuse end (Figs. 12-14).

Serrate, with small saw-like teeth (Fig. 15).

Dentate, with larger, more obtuse teeth (Fig. 16).

Crenate, rounded teeth (Fig. 17).

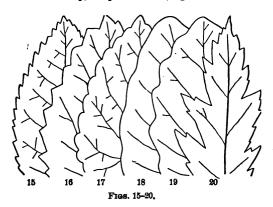
Repand, wavy margin, teeth broadly rounded, height less than breadth (Fig. 18).



Figs. 8-14.

Sinuate, still stronger waves, height equals or exceeds breadth (Fig. 19).

Incised, with sharp, deep incisions (Fig. 20).



The quantitative expression of variation in these forms can usually be easily obtained by using an index, or ratio of two dimensions.

Index of Linearness, greatest length greatest breadth.

- " Lanceolateness, $\frac{\text{greatest length}}{\text{greatest breadth}}$, also angle *abc*.
- " Oblongness, $\frac{\text{greatest length}}{\text{greatest breadth}}$, also $\frac{\text{area}}{\text{breadth}}$.
- " Ellipticity, (greatest lgth.)—(greatest brdth.)
 (greatest length)

for values from 1 to .50.

Index of Ovalness, (greatest length) — (greatest breadth)
(greatest length)
for values from .50 to .1.

- " Orbicularness, (greatest diam.) (greatest brdth.)
 (greatest diameter)
 for values from .1 to 0.
- " Ovateness or obovateness, $\frac{\text{radius of curvature of larger end}}{\text{radius of smaller end}}$
- "Cuneateness, diameter at \frac{1}{2}, or angle abc (line a-c)

 passing through middle of major diameter).

 length of radius of curve at broad
- " Spatulateness, end of organ transverse diameter of narrow part of organ
- " Acuminateness, angle abc at apex (Fig. 8).
- " Acuteness, angle abc at apex.
- " Obtuseness, angle abc at apex and radius of curvature.
- " Truncatedness, angle abe at apex and radius of curvature.
- " Retuseness, $\frac{\text{cosine}}{2 \times \text{sine}}$ of $\frac{1}{2}$ angle abc.
- " Serrateness, number of teeth per linear unit of edge, average angle of tooth.
- " "Dentateness, number of teeth, average angle of tooth,
- " "Crenateness, number of waves, average radius of curvature of waves.
- " Repandness, depth of waves, average radius of curvature of waves.
- " Sinuateness, depth of waves average radius of curvature of waves.
- " Incisedness, depth of incision opening of incision

Characters occupying three dimensions of space may be quantitatively expressed by volume. The volume of water or sand displaced may be used to measure volume in the case of solids. The volume of water or sand contained will measure a cavity. Irregular form is best measured by getting, either by means of photography or drawings, projections of the object on one or more of the three rectangular fundamental planes of the organ, and then measuring these plane figures as already described. Or two or more axes may be measured and their ratio found.

Characters having weight are easily measured; the only precautions being those observed by physicists and chemists.

Color Characters. Color may be qualitatively expressed by reference to named standard color samples. Such standard color samples are given in Ridgeway's book, "Nomenclature of Color," and also in a set of samples manufactured by the Milton Bradley Co., Springfield, Mass., costing 6 cents. The best way of designating a color character is by means of the color wheel, a cheap form of which (costing 6 cents) is made by the Milton Bradley Co. The colors of this "top" are standard and are of known wave-length as follows:

Red, 656 to 661 Green, 514 to 519
Orange, 606 to 611 Blue, 467 to 472
Yellow, 577 to 582 Violet, 419 to 424.

r

It is desirable to use Milton Bradley's color top as a standard. Any color character can be matched by using the elementary colors and white and black in certain proportions. The proportions are given in percents. In practice the fewest possible colors necessary to give the color character should be employed and two or three independent determinations of each should be made at different times and the results averaged. So far as my experience goes any color character is given by only one least combination of elementary colors. (See Science, July 16, 1897.)

When there is a complex color pattern the color of the different patches must be determined separately. In case of a close intermingling of colors, the colored area may be rapidly rotated on a turntable so that the colors blend and the result-

ant may then be compared with the color wheel. By this means also the total melanism or albinism, viridescence, etc., may be measured.

Marking-characters. The quantitative expression of markings or color patterns will often call for the greatest ingenuity of the naturalist. Only the most general rules can here be laid down. Study the markings comparatively in a large number of the individuals, reduce the pattern to its simplest elements, and find the law of the qualitative variation of these elements. The variation of the elements can usually be treated under one of the preceding categories. Find in how far the variation of the color pattern is due to the variation of some number or other magnitude, and express the variation in terms of that magnitude. Remember that it is rarely a question whether the variation of the character can be expressed quantitatively but rather what is the best method of expressing it quantitatively.

CHAPTER II.

On the Seriation and Plotting of Data and the Frequency Polygon.

The data obtained by measuring any character in a lot of individuals consists either of a mass of numbers for the character in each individual; or, perhaps, two numbers which are to be united to form a ratio; or, finally, a series of numbers such as are obtained by the color wheel, of the order: W 40%, N (Black) 38%, Y 12%, G 10%. The first operation is the simplification of data. Each variate must be represented by one number only. Consequently, quotients of ratios must be determined and that single color of a series of colors which shows most variability in the species must be selected, e.g., N.

The process of seriation, which comes next, consists of the grouping of similar magnitudes into the same magnitude class. The classes being arranged in order of magnitude, the number of variates occurring in each class is determined. The number of variates in the class determines the frequency of the class.

The method of seriation may be illustrated by two-examples; one of integral variates, and the other of graduated variates.

Example 1. The magnitude of 21 integral variates are found to be as follows: 12, 14, 11, 13, 12, 12, 14, 13, 12, 11, 12, 12, 11, 12, 10, 11, 12, 13, 12, 13, 12, 12. In seriation they are arranged as follows:

Classes: 10, 11, 12, 13, 14. Frequency: 1, 4, 11, 4, 2,

Example 2. In the more frequent case of graduated variates our magnitudes might be more as follows:

3.2	4.5	5.2	5.6	6.0
8.8	4.7	5.2	5.7	6.2
4.1	4.9	5.3	5.8	6.4
4.3	5.0	5.8	5.8	6.7
4.8	. 5.1	5.4	5.9	7.3

In this case it is clear that our magnitudes are not exact, but are merely approximations of the real (forever unknowable) value. The question

arises concerning the inclusiveness of a class—the class range. An approximate rule is: Make the classes only just large enough to have no or very few vacant classes in the series. Following this rule we get

	(8.0-8.4;	3.5-3.9;	4.0-4.4;	4.5-4.9;	5.0-5.4
Classes	8.2	3.7	4.2	4.7	5.2
	(1	•2	8	4	5
Frequency	1	1	8	3	7
Classes	(5.5-5.9;	6.0-6.4;	6.5-6.9;	7.0-7.4;	
Classes	₹ 5.7	6.2	6.7	7.2	
	(6	7	8	9 .	
Frequency	5	3	1	1	

The classes are named from their middle value, or better, for ease of subsequent calculations, by a series of small integers (1 to 9).

In case the data show a tendency of the observer towards estimating to the nearest round number, like 5 or 10, each class should include one and only one of these round numbers.

As Fechner ('97) has pointed out, the frequency of the classes and all the data to be calculated from the series will vary according to the point at which we begin our seriation. Thus if, instead of beginning the series with 3.0 as in our example, we begin with 3.1 we get the series:

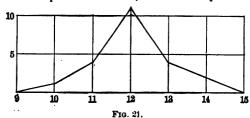
which is quite a different series. Fechner suggests the rule: Choose such a position of the classes as will give a most normal distribution of frequencies. According to this rule the first distribution proposed above is to be preferred to the second.

In order to give a more vivid picture of the frequency of the classes it is important to plot the frequency polygon. This is done on coordinate paper.*

A different method should be adopted according as integral or graduated variates are under consideration. In the case of integral variates proceed as follows: At equal intervals along a horizontal line (axis of X) draw a series of (vertical) ordinates whose successive heights shall be proportional to the frequency of the classes. Join the tops of the ordinates. Thus for the example given, the curve will be as shown in Fig. 21. This method of drawing the frequency polygon is known as the method of loaded ordinates.

^{*} This paper may be obtained at any artists' supply store.

In the case of graduated variates proceed as follows: Lay off along a horizontal line equal contiguous spaces each of which shall represent one class, number the spaces in order



from left to right with the class magnitudes in succession, and erect upon these bases rectangles proportionate in height to the frequency of the respective classes (Fig. 22).



This method of drawing the frequency polygon is known as the method of rectangles. If the tops of the middle ordinates of successive contiguous rectangles be connected by an oblique line a polygon made up of trapezia is obtained. The outline of the polygon will be fairly close to that of a curve passing through the tops of the central ordinates of the rectangles.

CERTAIN CONSTANTS OF THE FREQUENCY POLYGON.

After the data have been gathered and arranged it is necessary to determine the law of distribution of the variates. To get at this law we must first determine certain constants.

The **mean** (M) is the abscissa of the centre of gravity of the variates or of the frequency polygon. It is found by the formula

$$M = \frac{\Sigma(V, f)}{n},$$

in which V is the magnitude of any class; f its frequency;

 Σ indicates that the sum of the products for all classes into frequency is to be got, and n is the number of variates.

Thus in the last example:

$$\begin{array}{ll} \textit{M} &= (3.2\times1+3.7\times1+4.2\times3+4.7\times3+5.2\times7+5.7\times5+6.2\times3\\ &\quad +6.7\times1+7.2\times1)+25=5.24,\\ \text{or} &\quad \end{array}$$

$$M_1 = (1 \times 1 + 2 \times 1 + 3 \times 3 + 4 \times 3 + 5 \times 7 + 6 \times 5 + 7 \times 3 + 8 \times 1 + 9 \times 1) + 25 = 5.08,$$

 $M = 5.2^{\circ} + .08(5.7 - 5.2) = 5.24$

A still shorter method of finding M is given on page 17.

The mode is the class with the greatest frequency.

In the example, the mode is 5.2.

The **median magnitude** is one above which and below which 50% of the variates occur. It is such a point on the axis of X of the frequency polygon that an ordinate drawn from it bisects the polygon of rectangles or the continuous curve, but not the polygon of loaded ordinates.

To find its position: Divide the variates into three lots: those less than the middle class, of which the total number is a; those of the middle class, b; and those greater, c. Then a+b+c=n= the total number of variates. Let l'= the lower limiting value of the middle class, and l''= the upper limiting value, and let x= the abscissal distance of the median ordinate above the lower limit or below the upper limit of the median class according as x is positive or negative. Then n-a:b=x:l''-l' when x is positive, or n-c:b=x:l''-l' when x is negative.

Thus in the last example: 12.5 - 8: 7 = x: 0.5; x = .32; the median magnitude = 5.0 + .32 = 5.32. Or 12.5 - 10: 7 = -x: 0.5; x = -.18; the median magnitude = 5.5 - .18 = 5.32. (Cf. p. 11.)

Every determination of a constant of the frequency polygon is an approximation only to the true value of the constant. The closeness of the approximation to the truth is measured by the so-called probable error of the determination. This is a pair of values lying one above and one below the value determined. We can say that there is an even chance that the true value lies between these limits; the chances are 4 to 1 that the true value lies within twice these limits, and 19 to 1 that it lies within thrice these limits.

The probable error of the mean is given by the formula

$$\pm 0.6745 \times \frac{\text{standard deviation [see below]}}{\sqrt{\text{number of variates}}} = \pm 0.6745 \frac{\sigma}{\sqrt{n}}$$

It will be seen that the probable error is less, that is, that the result is more accurate, the greater the number of variates

^{* 5.2} is the true class magnitude corresponding to the integer 5.

measured, but the accuracy does not increase in the same ratio as the number of individuals measured, but as the square root of the number. The probable error of the mean decreases as the standard deviation decreases.

The index of the variability, σ , of the variates when they group themselves about one mode is found by adding the products of the squared deviation-from-the-mean of each class multiplied by its frequency, dividing by the total number of variates, and extracting the square root of the quotient, thus:

$$\sigma = \sqrt{\frac{\text{sum of [(deviation of class from mean)}^2}{\text{x frequency of class]}}}{\text{number of variates}}}$$

$$= \sqrt{\frac{\Sigma(x^3.f)}{n}}.$$

This measure is known as the standard deviation.

The probable error of the standard deviation is

$$\pm$$
 0.6745 $\frac{\text{standard deviation}}{\sqrt{2} \times \text{number of variates}} = \pm 0.6745 \frac{\sigma}{\sqrt{2n}}$.

Other Indices of Variation are the average deviation, or average departure, which is found thus:

A.D. =
$$\frac{\text{sum of [deviations of class from mean} \times \text{frequency}]}{\text{number of variates}}$$

The **probable error** is the distance from the mode of that ordinate which exactly bisects the half curve 0MX or $0MX^1$, Fig. 23; it is equal to $0.6745 \times$ standard deviation = 0.6745σ . Neither of these last two indices of variation is as good as the standard deviation when n is rather small.

The standard deviation, like the other indices of variation, is a concrete number, being expressed in the same units as the magnitudes of the classes. The standard deviation of one lot of variates is consequently not comparable with the S. D. of variates measured in other units. It has been proposed to reduce the index of variation to a concrete number, independent of any particular unit, by dividing the index of variation of any variates by the mean; the quotient multiplied by 100 is called

the coefficient of variability. In a formula,
$$CV = \frac{\sigma^{-1}}{M}$$
.

(Pearson, '96; Brewster, '97)

CHAPTER III.

THE CLASSES OF FREQUENCY POLYGONS.

The plotted curve may fall into one of the following classes:

- A. Unimodal.
 - I. Simple.
 - 1. Range unlimited in both directions:
 - a. Symmetrical. The normal curve.
 - b. Unsymmetrical (Pearson's Type IV).
 - 2. Range limited in one direction, together with skewness (Type III).
 - 3. Range limited in both directions :
 - a. Symmetrical, Type II.
 - b. Unsymmetrical, Type I.
 - II. Complex.
- B. Multimodal.

The classification of any given curve is not always an easy task. Whether the curve is unimodal or multimodal can be told by inspection. Whether any unimodal curve is simple or complex cannot be told by any existing methods without great labor and uncertainty in the result.

Complex curves may be classified as follows:

- 1. Composed of two curves, whose modes are different but so near that the component curves blend into one; such curves are usually unsymmetrical.
- 2. The sum of two curves having the same mode but differing variability.
- 3. The difference of two curves having the same mode but differing variability.

If the material is believed to be homogeneous and the curve is unimodal it is probably simple and its classification may be carried further.

For classification the rule is as follows: Determine the mean of the magnitudes. Take a class near the mean (call it V_{m})

as a zero point; then the departure of all the other classes will be -1, -2, -3, etc., and +1, +2, +3, etc.

Add the products of all these departures multiplied by the frequency of the corresponding class and divide by n; call the quotient ν_1 .

Add the products of the squares of all the departures multiplied by the frequency of the corresponding class and divide by n; call the quotient ν_2 .

Add the products of the *cubes* of all the departures multiplied by the frequency of the corresponding class and divide by n; call the quotient ν_2 .

Add the products of the fourth powers of all the departures multiplied by the frequency of the corresponding class and divide by n; call the quotient ν_4 . Or,

$$v_1 = \frac{\sum (V - V_m)}{n} = \text{departure of } V_m \text{ from mean.} \quad V_m \text{ being known, } M \text{ may be found } [M = V_m + v_1];$$

$$\boldsymbol{\nu_2} = \frac{\boldsymbol{\Sigma}(V - V_m)^{\frac{9}{\cdot}}}{n};$$

$$\nu_{s} = \frac{\sum (V - V_{m})^{s}}{n};$$

$$\nu_4 = \frac{\sum (V - V_m)^4}{n}.$$

The values ν_1 , ν_2 , ν_3 , ν_4 , are called respectively the first, second, third, and fourth moments of the curve about V_m .

To get the moments of the curve about the mean, either of two methods (A or B) will be employed. Method A is used when integral variates are under consideration; method B when we deal with graduated variates.

(A) To find moments in case of integral variates:

$$\begin{array}{l} \mu_1 = 0; \\ \mu_2 = \nu_3 - \nu_1^2; \\ \mu_3 = \nu_3 - 8\nu_1\nu_2 + 2\nu_1^3; \\ \mu_4 = \nu_4 - 4\nu_1\nu_3 + 6\nu_1^2\nu_3 - 8\nu_1^4. \end{array}$$

(B) To find moments in case of graduated variates:

^{*} This is the short method of finding M referred to on page 14.

$$\begin{array}{l} \mu_1 = 0; \\ \mu_2 = \nu_2 - \nu_1^2 + \frac{1}{6}; \\ \mu_3 = \nu_3 - 3\nu_1\nu_2 + 2\nu_1^3; \\ \mu_4 = \nu_4 - 4\nu_1\nu_3 + 6\nu_1^2\nu_2 - 3\nu_1^4 + \nu_2 - \nu_1^2 + \frac{1}{16}. \\ \Delta lso, \qquad \beta_1 = \frac{\mu_3^2}{\mu_2^{3}}, \ \beta_2 = \frac{\mu_4}{\mu_2^2}. \end{array}$$

 $F = 6 + 3\beta_1 - 2\beta_2 =$ the "critical function."

Now the classification of any empirical curve depends upon the value of its critical function, F.

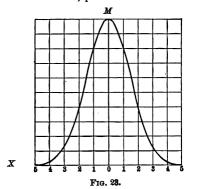
When
$$F$$
 is positive and $\begin{cases} \beta_1 > 0, \text{ curve is of Type I.} \\ \beta_1 = 0, \beta_2 < 3, \text{ curve is of Type II.} \end{cases}$

"
 $F = 0$ and $\begin{cases} \beta_1 > 0, \beta_2 > 3, \text{ curve is of Type III.} \\ \beta_1 = 0, \beta_2 = 3, \text{ curve is normal.} \end{cases}$
"
 F is negative and $\beta_1 > 0, \beta_2 > 3, \text{ curve is normal.} \end{cases}$

An important relation to be referred to later is

$$s=\frac{6(\beta_2-\beta_1-1)}{F},$$

in which s is an unknown, positive number.



THE NORMAL CURVE.

X

The **normal curve** is symmetrical about the mode; consequently the mode and the median and mean class coincide.

The mathematical formula of the normal curve, a formula which one does not have to understand in order to make use of it, is

$$y = \frac{\alpha}{\sigma \sqrt{2\pi}} \cdot \frac{1}{e^{x^2/\sigma^2}}.$$

This formula gives the value of any ordinate y (or any class) at any distance x (measured along the base, X, X, of Fig. 23) from the mode. e is a constant number, 2.71828, the base of the Naperian system of logarithms. α is the total area of the curve or number of variates, and σ is the Standard Deviation, which is constant for any curve and measures the variability of the curve, or the steepness of its slope.

To compare any observed curve with the theoretical normal curve we can make use of tables. For the case of a polygon of integral variates the theoretical frequency of any class at a deviation $\frac{x}{\sigma}$ from the mean can be taken directly from Table III. Here x is the actual deviation from the mean expressed in the unit of the maximum, and σ is the standard deviation.

For the case of a polygon of graduated variates built up of rectangles representing the relative frequency of the variates, Table IV gives the relation of the actual to the theoretical number of individuals occurring between the values $+\frac{x}{\sigma}$ and $-\frac{x}{\sigma}$. By looking up the given values of $\frac{x}{\sigma}$ the corresponding theoretical percentage of variates between the limits $+\frac{x}{\sigma}$ and $-\frac{x}{\sigma}$ will be found directly. The ratio $\frac{x}{\sigma}$ may be

The normal curve may preferably be employed even when β_1 is not exactly equal to 0, nor β_2 exactly equal to 3, nor F exactly equal to 0. Use the normal curve when

called the Index of Abmodality.

$$F \times \mu_2^2 < \pm 1$$
 and $\frac{3\nu_2^2 - 2\nu_1^4}{\nu_4} = 1 \pm .2$

To determine the closeness of fit of a theoretical polygon to the observed polygon. There are two methods according as the variates are (A) integral or (B) graduated.

(A) Find for each class the percentage which the difference between the theoretical value y and the observed frequency f is of the frequency, and find the average of these percentages, which is the index of closeness of fit sought.

(B) Subtract in order each theoretical value of y from the corresponding observed value, regarding signs. Call the dif-Whenever in the successive values of δ_1 there is a change of sign, divide the product of these successive values of δ_1 , in pairs, by their sum. Call this value δ_2 ; make its sign always minus. Then the difference between the two polygons in per cent of one of them is given by the equation

$$\Delta \% = \frac{\Sigma \delta_1 + (-\delta_2)}{2n} 100,$$

where δ_1 is summated without regard to sign, and n equals the total number of variates. This is the method of Duncker, It may be considered a sufficient agreement between observation and calculation when $\Delta < \frac{100}{\sqrt{n}}$.

THE NORMAL CURVE OF FREQUENCY AS A BINOMIAL CURVE.

The normal curve may also be expressed by the binomial formula $(p+q)^l$, where $p=\frac{1}{4},q=\frac{1}{4}$, and l is the number of terms, less 1, in the expansion of the binomial; hence approximately the number of classes into which the magnitudes of the variates should fall. If the standard deviation be known, I may be found by the equation

$$l = 4 \times (\text{Standard Deviation})^2 = 4\sigma^2$$
.

Example of (nearly) normal curve. Number of spines in dorsal fin of Acerina cernua, L. (Duncker, '99, p. 177).

 $\mu_2 = 0.8895 - 0.1568^2$

 $\mu_3 = 0.2011 - 3 \times 0.1568 \times 0.3895 + 2 \times 0.1568^3 = 0.0257$

 $\mu_4 = 0.5663 - 4 \times 0.1568 \times 0.2011 + 6 \times 0.1568^2 \times 0.3895 - 3 \times 0.1568^4 = 0.4929$

$$\beta_1 = \frac{0.0257^2}{0.3650^3} = 0.01358; \qquad \beta_2 = \frac{0.4929}{0.3650^2} = 3.6998.$$

$$F = 6 + .04074 - 7.3996 = -1.3589$$
. $F \cdot \mu_2^3 = 1.3589 \times 0.365^3 = .066$.

$$\frac{8\nu_3{}^2-2\nu_1{}^4}{\nu_4}=\frac{3\times0.3895{}^3-2\times.1568{}^4}{0.5663}=.71, \qquad \sigma=\sqrt[4]{\mu_2}=.6041.$$

Maximum frequency =
$$\frac{n}{\sigma \sqrt{2\pi}} = \frac{1900}{.6041 \times \sqrt{2\pi}} = 1255$$
.

Although somewhat more closely of Type IV (see page 18) than of the Normal Type, this example may be treated as Normal.

The difference between it and the normal is found below to be 1.39%.

To illustrate the method, and in accordance with Duncker's example, Δ is here, exceptionally, calculated by rule page 20.

$$\Delta = \frac{100(60.8 - 23.1)}{3800} = 0.99\%.$$

The values of y in the table above are calculated from the formula $y = y_0 \cdot e^{-x^2/2\sigma^2}$. The sum of the theoretical y values should equal the total number of variates.

OTHER UNIMODAL FREQUENCY POLYGONS.

The formulas of the remaining four types of unimodal simple frequency polygons have a family resemblance with the formula

$$y = y_0 e^{-\frac{x^3}{2\sigma^2}}$$

of the normal curve. They are as follows:

Curve of limited range on both sides:

Unsymmetrical,
$$y = y_0 \left(1 + \frac{x}{\alpha_1}\right)^{m_1} \left(1 - \frac{x}{\alpha_2}\right)^{m_2}$$
, Type I.

Symmetrical,
$$y = y_0 \left(1 - \frac{x^2}{a^2}\right)^m$$
, Type II.

Curve of range limited on one side:

Unsymmetrical,
$$y = y_0 \left(1 + \frac{x}{a}\right)^p e^{-x/d}$$
, Type III.

Curves of unlimited range on both sides:

Unsymmetrical, $y = y_0 \cos \theta^{2m} e^{-v\theta}$, where $\tan \theta = \frac{x}{a}$. Type IV.

[Symmetrical,
$$y = y_0 e^{-\frac{x^2}{2\sigma^2}}$$
, the normal curve.]

In these formulas:

 $y_0 = \text{modal ordinate}$, to be especially reckoned for each type.

y = the length of the ordinate (or area of rectangle) located at the distance x from y_0 .

a = a part of the abscissa-axis XX^{r} expressed in units of the classes.

e = the base of the Naperian system of logarithms, 2.71828.

Curves of limited range are theoretically different from the normal curve, which theoretically applies to cases where the classes have an infinite range above and below the mean. Such an infinite range is rare in biological statistics, although, as stated, the normal curve often fits observational curves very closely. The range in biological statistics may be limited at both extremes. Thus, the ratio of carapace length to total length of the lobster is limited between 0 and 1.

The range may be limited on one side only. Thus the ratio Antero-Post. Diam. of a bivalve shell may conceivably range from 0 to ∞ . The forms of the molluscan genera Pinna (or Malleus) and Solen approach such extremes.

Asymmetry or **skewness** is found in Type I (of which Type II is the symmetrical limit), Type III and Type IV. In skew curves the mode and the mean are separated from each other by a certain distance, d. Asymmetry is measured by a factor

$$A = \frac{d}{\sigma} = \frac{1}{2} \sqrt{\beta_1} \frac{s \pm 2}{s \mp 2}, \text{ where } s = \frac{6(\beta_2 - \beta_1 - 1)}{2\beta_2 - 3\beta_2 - 6};$$

the result has the same sign as μ_* .

In Type I,
$$A = \frac{1}{2} \sqrt{\beta_1} \frac{s+2}{s-2}$$
.

" " III,
$$A = \frac{1}{6} \sqrt{\beta}$$
.

" " IV,
$$A = \frac{1}{2} \sqrt{\beta_1} \frac{s-2}{s+2}$$
.

To compare any observed frequency polygon of Type I with its corresponding theoretical curve.

$$y = y_0 \left(1 + \frac{x}{a_1}\right)^{m_1} \left(1 - \frac{x}{a_2}\right)^{m_2}$$

To find a1, a2, m1, m2, ?'0.

The total range, b, of the curve (along the abscissa axis) is found by the equation

$$b = \frac{\sigma}{2} \sqrt{\beta_1(s+2)^2 + 16(s+1)};$$

 a_1 and a_2 are the ranges to the one side and the other of y_0 ;

$$\begin{aligned} a_1 &= \frac{1}{2}(b-ds); & d &= \sigma A = \sqrt[4]{a_1} \cdot A; \\ a_2 &= b - a_1; & \\ m_1 &= \frac{a_1}{b}(s-2); & m_1 + m_2 = s - 2; \\ y_0 &= \frac{\alpha}{b} \cdot \frac{m_1 + m_2 + m_3}{(m_1 + m_2)^{m_1 + m_2}} \cdot \frac{\Gamma(m_1 + m_2 + 2)}{\Gamma(m_1 + 1)(m_2 + 1)}. \end{aligned}$$

To solve this equation it will be necessary to determine the value of each parenthetical quantity following the Γ sign and find the corresponding value of Γ from Table V. It is, however, sometimes easier to calculate the value of y_0 from the following approximate formula:

$$y_0 = \frac{\alpha}{b} \cdot \frac{(m_1 + m_2 + 1) \sqrt{m_1 + m_2}}{\sqrt{2\pi m_1 m_2}} e^{\frac{1}{12} \left(\frac{1}{m_1 + m_2} - \frac{1}{m_1} - \frac{1}{m_2}\right)}.$$

With these data the theoretical curve of Type I may be drawn. Frequency polygons of Type I are found in biological measurements.

To compare any observed frequency polygon of Type II with its corresponding theoretical curve.

$$y=y_0\Big(1-\frac{x^2}{a^2}\Big)^m.$$

This equation is only a special form of the equation of Type I in which $a_1 = a_2$ and $m_1 = m_2$.

As from page 17, $\beta_1 = 0$ in Type II, $b = 2\sigma \sqrt{s+1}$; since the curve is symmetrical, d = 0, and

$$a = \frac{b}{2}$$
; $m = \frac{1}{2}(s-2)$; $y_0 = \frac{\alpha}{a} \frac{\Gamma(m+1.5)}{4\sqrt{\pi}\Gamma(m+1)}$.

The Γ values will be found from Table V.

An approximate formula for y_0 is given by Duncker as follows:

$$y_0 = \frac{\alpha}{\sigma \sqrt{2\pi}} \frac{s-1}{\sqrt{(s+1)(s-2)}} e^{-\frac{1}{4(s-2)}}.$$

To compare any observed frequency curve of Type III with its corresponding theoretical curve.

$$y = y_0 \left(1 + \frac{x}{a}\right)^p e^{-x/d}.$$

Also.

The range at one side of the mode is infinite; at the other is found by the formula

$$a = \sigma \frac{4 - \beta_1}{2 \sqrt{\beta_1}} = \sigma \frac{1 - A^2}{A} \text{ (for Type III)}.$$

$$p = \frac{a}{d} = \frac{a}{\sigma A}; \quad y_0 = \frac{\alpha}{a} \cdot \frac{p^{p+1}}{e^p \Gamma(p+1)}.$$

The value of Γ corresponding to p+1 can be got from Table V, Appendix.

To compare any observed frequency curve of Type IV with its corresponding theoretical curve.

This is the commonest type of biological skew curves.

$$y = y_0(\cos\theta)^{2m} \cdot e^{-v\theta}.$$

 θ is a variable, dependent upon x as shown in the equation

$$x = a \tan \theta$$
.

The factor $(\cos \theta)^{2m}$ following y_0 indicates that the curve is not calculated from the mean ordinate (M), or the mode (M-d), but that the zero ordinate is at M-md; or at a distance $m \times d$ from the mean.

$$a = \frac{\sqrt{\mu_2}}{4} \sqrt{16(s-1) - \beta_1(s-2)^2}; \qquad m = \frac{1}{2}(s+2);$$

$$d = \frac{\sigma}{2} \sqrt{\beta_1} \frac{s-2}{s+2}; \qquad md = \frac{\sigma}{4} \sqrt{\beta}(s-2);$$

$$\sigma = \frac{\sqrt{\mu_2} s(s-2) \sqrt{\beta_1}}{4a}, \text{ with the opposite sign to } \mu_0;$$

$$\theta$$
 (arc of circle) = $\frac{\pi\theta^{\circ}}{180^{\circ}}$;

$$y_0 = \frac{\alpha}{\alpha} \sqrt{\frac{s}{\frac{s}{2\pi}}} \frac{\frac{(\cos\phi)^2}{3s} - \frac{1}{12s} - v\phi.^*}{(\cos\phi)^{s+1}}.$$

 ϕ = angle whose tangent is $\frac{v}{s}$.

$$y_0 = \frac{\alpha}{a} \cdot \frac{e^{\frac{1}{4}v\pi}}{\int_0^{2\pi} (\sin\theta)^8 e^{v\theta} d\theta},$$

the formula for reducing which is to be gained from the integral calculus.

^{*}The foregoing value is approximate and is applicable when, as is usually the case, s is greater than 2. The exact value is given by Pearson as

Example of calculating the theoretical curve corresponding with observed data. (Fig. 24.)

Distribution of frequency of glands in the right fore leg of 2000 female swine (integral variates):

Number of glands 0 1 2 8 4 5 6 7 8 9 10 Frequency...... 15 209 365 482 414 277 134 72 22 8 2

Assume the axis yy' (Vm) to pass through ordinate 4, then:

$$\nu_1 = -998 + 2000 = -.499.$$

$$\nu_{\bullet} = 6148 + 2000 = 3.074$$

$$\nu_3 = -3872 + 2000 = -1.936$$
.

$$\nu_{A} = 48568 + 2000 = 24.284$$
.

$$\mu_1 = M = 4 - .499 = 3.501.$$

$$\mu_2 = 3.074 - (-.499)^2 = 2.824999.$$

$$\mu_2 = -1.936 - 8(-.499 \times 8.074) + 2(-.499)^2 = 2.417278$$

$$\mu_4 = 24.284 - 4(-.499 \times -1.936) + 6(.249001 \times 3.074) - 3(-499)^4 = 24.826297$$

$$\beta_1 = \frac{(2.417278)^2}{(2.824999)^3} = \frac{5.843232929}{22.545241688} = 0.259178.$$

$$\beta_3 = \frac{24.826297}{(2.824999)^2} = \frac{24.826297}{7.98061935} = 3.110823,$$

$$F = 6 + 3 \times 0.259178 - 2 \times 3.110823 = +0.555888$$
 (Type I).

$$s = \frac{6(8.11082 - 0.25918 - 1)}{.55589} = 19.9857.$$

$$A = \frac{1}{16} \sqrt[4]{.259178} \frac{21.9857}{17.9857} = .31115.$$

$$d = 1.680774 \times .3111 = .5230$$

$$d.s = .5230 \times 19.9857 = 10.4519.$$

$$b = .840887 \sqrt{16 \times 20.9857 + 0.25918 \times (21.9857)^3} = 18.0448$$

$$a_1 = \frac{18.0448 - 10.4519}{2} = 8.7965.$$

$$\begin{aligned} \alpha_2 &= 18,0448 - 8,7965 = 14,2488, \\ m_1 &= \frac{3.7965 \times 17,9887}{18.0448} = 3,78401, \\ m_2 &= \frac{14,2483 \times 17,9857}{18,0448} = 14,2006, \\ y_0 &= \frac{2000}{18,0448} \frac{(18,9846) \sqrt{17,9846}}{\sqrt{2\pi \times 3,7840 \times 14,2006}} \times 2,171828 \end{aligned}$$

= 475.24, the number of cases in the modal class.

The equation of the theoretical curve is thus

$$y = 475.24 \left(1 + \frac{x}{3.796}\right)^{3.784} \left(1 - \frac{x}{14.248}\right)^{14.201},$$

where x is the difference between the class magnitude and the $mode_i$ regarding signs.

Position of the mode, $y_0 = M - d = 3.501 - .523 = 2.978$.

The mean percentage deviation of the theoretical ordinates from the observed ordinates is 11.4%* (Method A). This is calculated as follows:

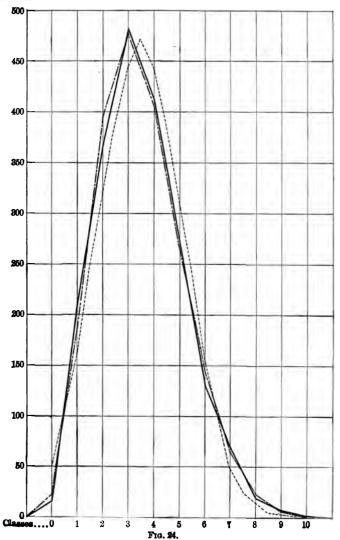
V	f observed	y theoretical	8	*
- 1	0	0.0	0.0	
0	15	21.1	— 6.1	40.7
1	209	185.8	+23.2	11.1
2	3 65	395.1	30.1	8.2
8	482	475.2	+ 6.8	1.4
4	414	405.6	+ 8.4	2.0
5	277	272.1	+4.9	1.8
6	134	147.6	- 13.6	10.2
7	72	65.9	+ 6.1	8.5
8	22	24.1	- 2.1	9.5
9	8	7.0	+ 1.0	12.5
10	2	1.6	+ 0.4	20.0
11	0	0.2	-	
12	0	0.0		11.4%

MULTIMODAL CURVES.

Multimodal curves are given when the frequency in the different classes exhibits more than one mode. False multimodal curves result from too few observations, or when the classes are made too numerous for the variates. By increasing the number of variates or by making the classes more inclusive some of the modes disappear.

^{*} The mean percentage deviation by Duncker's determination with method B using the same data is 1.73% of area.





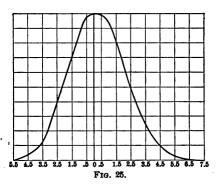
Distribution of frequency in glands of swine.

polygon of observed frequency.

normal frequency polygon.

normal frequency polygon.

Multimodal curves differ in degree. The modes may be so close that only a single mode (usually in an asymmetrical curve) appears in the result; or one of the modes may appear as a hump on the other; or the two modes may even be far apart and separated by a deep sinus (Figs. 25 to 28).



Pearson has offered a means of breaking up a compound curve with apparently only one mode into two curves having distinct modes; but this method is very tedious and rarely applicable.

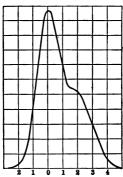
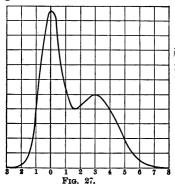


Fig. 26.

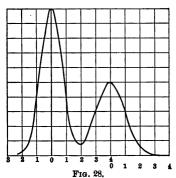
The index of divergence of two modes of a multimodal curve is the distance between the modes expressed in terms of the standard deviation of the more variable of the components.*

The index of isolation of two masses of variates grouped about adjacent modes is the ratio of the depression between the modes to the height of the shorter mode.

The meaning of multimodal curves is diverse. Sometimes



they indicate a polymorphic condition of the species, the modes representing the different type forms. This is the case with



the number of ray flowers of the white daisy which has modes at 8, 13, 21, 34, etc. Sometimes they indicate a splitting of a species into two or more varieties.

^{*} I have proposed (Science, VII, 685) to measure the divergence in a unit = $3 \times$ Standard Deviation, which has certain advantage in species study.

CHAPTER IV.

CORRELATED VARIABILITY.

Correlated variation is such a relation between the magnitudes of two or more characters that any abmodality of the one is accompained by a corresponding abmodality of the other or others.

The methods of measuring correlation depend upon the assumption that the variates of the characters compared are distributed normally about the mode. The method is approximately applicable to cases where the distribution of variates is slightly skew.

The principles upon which the measure of correlated variation rest are these. When we take individuals at random we find that the mean magnitude of any character is equal to the mean magnitude of this character in the whole population. Deviation from the mean of the whole population in any lot of individuals implies a selection. If we select individuals on the basis of one character (A, called the subject) we select also any closely correlated character (B, called the relative) (e.g. leglength and stature). If perfectly correlated, the index of abmodality of B will be as great as that of A or

If there is no correlation, then whatever the value of the index of modality of the subject, that of the relative will be zero and the coefficient of correlation will be

$$\frac{\text{Index of abmodality of relative}}{\text{Index of abmodality of subject}} = \frac{0}{m} = 0.$$

The coefficient of correlation is represented in formulas by the letter ρ . We cannot find the degree of correlation between two organs by measuring a single pair only; it is the correlation "in the long run" which we must consider. Hence we must deal with masses and with averages.

	{				-	-			-	-						
Classes (Classes of left leg.	•	-	C5	တ	4	ю	9	£	œ	a	10				_
Deviations	Deviations of rel. class.	18.54	-2.54	-2.54 -1.54 -0.54		0.46	1.46	2.46	3.46	4.46	5.46	6.46	Means left.		Dev. Re S. D. re	1. Dev.Subj S.D. subj
Classes of right leg.	Deviation from mean.															
•	-3.547	80	ю	63	-	:	:	i	:	:	•		0.600	-2.940	-1.7	-2.05
-	-8.547	4	151	28	•	တ	:	:		:	:	:	1,360	-2.180	1.38	-1.47
CQ.	-1.547	0>	8	25	88	88	6-	-	:	:	į	:	3.306	-1.234	0.70	-0.90
••	-0.547		14	88	173	128	88	9	i	•	i	:	3.197	-0.343	-0.30	-0.32
4	0.453	•	10	23	119	158	4	88	69	-	•	i	8.888	0.848	0.20	0.26
10	1.458	:	-	۲-	\$	83	101	23	Ξ	6	i	Ī	4.784	1.244	0.72	0.84
9	2.453	:	i	:	80	16	88	8	91	۲-	•	6 2	5.510	1.970	1.14	1.42
2-	3.453	<u>:</u>		i	-	90	8	18	11	0	40	:	6.141	2.601	1.50	2.00
œ	4.453	:	i	i	i	-	80	ĸ	80	01	CQ.	:	6.500	2.900	1.7	2.57
•	5.453	:	i	i	:	:	_	တ	၈	C)	C1	-	7.838	3.793	2.19	3.15
10	6.453	<u>:</u>	i	i	i	i	:	:	i	į	-	i	9.000	5.460	3.25	8.73

Mean number of glands, right leg, male = 3.547

Standard deviation, relative, 1.78 subject, 1.78

In studying correlation one (either one) of the characters is regarded as subject and the other as relative. A correlation table is then arranged as in the example on page 29, which gives data for determining the correlation between the number of Müllerian glands on the right (subject) and left (relative) legs of male swine.

METHODS OF DETERMINING COEFFICIENT OF CORRELATION.

Galton's graphic method. On co-ordinate paper draw perpendicular axes X and Y; locate a series of points from the pairs of indices of abmodality of the relative and subject corresponding to each subject class. The indices of the subjects are laid off as abscissæ; the indices of the relatives as ordinates, regarding signs. Get another set of points by making a second correlation table, regarding character B as subject and character A as relative. Then draw a straight line through these points so as to divide the region occupied by them into halves. The tangent of the angle made by the last line with the horizontal axis XX (any distance yp, divided by xp) is the index of correlation.

A more precise method is given by Pearson as follows: Sum of products (deviation subj. class × deviation each assoc. rel. class × no. of cases in both)

total no. of indivs. × Stand. Dev. of subject × Stand. Dev. of relative;

or, expressed in a formula:

$$\rho = \frac{\sum (\text{dev. } x \times \text{dev. } y \times f)}{n\sigma_1\sigma_2}.$$

This method requires finding many products in the numerator, as many sets of products as there are entries in the body of the correlation table. A portion of the products to be found is indicated below;

$$\begin{array}{l} -8.547 \times \begin{cases} -8.540 \times 8 \\ -2.540 \times 5 \\ -1.540 \times 2 \end{cases} \\ -2.540 \times 4 \\ -2.540 \times 151 \\ -1.540 \times 58 \\ -0.540 \times 9 \\ -0.460 \times 8 \\ \text{etc.} \end{array}$$

A brief method of finding ρ is given by Duncker as follows:

$$ho$$
 is composed of two factors: $\frac{\sum (\text{dev. } x \times \text{dev. } y \times f)}{n}$ and $\frac{1}{\sigma_1 \sigma_2}$

To find $\frac{\sum (\text{dev. } x \times \text{dev. } y \times f)}{n}$.

Separate the deviation from the mean of each class into its integral and its fractional parts; the fractional parts for all classes below the mean will be equal to the fractional part of the mean; of all classes above the mean, to the complement of that number. Designate the integral parts of the variants of the subject by $\pm X_1$; of the relatives by $\pm X_2$, and the fractional complement parts of the means of subject or relative by ξ_1, ξ_2 . Let f equal the frequency of any deviation in the combination X_1X_2 , as shown in the correlation table. Draw rectangular co-ordinates as shown on page 34 through the zeropoint of the correlation table. Number the N. W. quadrant, which should include negative deviations of both subject and relative variants, I; the N. E. quadrant, II; the S. W. quadrant containing solely positive deviations III; and the S. E. quadrant, IV. Then if $\Sigma_{\rm r}$, $\Sigma_{\rm u}$, etc., indicate a summation for the quadrant I, II, etc., and having regard to signs:

$$\frac{\sum X_1 X_2 f}{n} = \frac{\sum_{1 - IV} (f X_1 X_2) - \sum_{I} (f X_1) - \sum_{II} (f X_2)}{+ \sum_{I} (f) - \sum_{II} (f X_2) - \sum_{III} (f X_1)} - \xi_1 \xi_2.$$

The numerator of this fraction consists entirely of whole numbers; of them the following are on their own account

positive:
$$\Sigma_I(fX_1X_2)$$
, $\Sigma_{IV}(fX_1X_2)$, $\Sigma_I(f)$, $\Sigma_{II}(fX_2)$, $\Sigma_{III}(fX_1)$, negative: $\Sigma^{II}(fX_1X_2)$, $\Sigma_{III}(fX_1X_2)$, $\Sigma_I(fX_1)$, $\Sigma_I(fX_2)$.

Rule: (1) Find products of integral parts of deviations of both subject and relative and the combination frequency, for all four quadrants, and take their sum.

(2) Subtract successively the sum of the products of the subject deviations in the first quadrant multiplied by the frequency, and the sum of the products of the relative deviations in the first quadrant multiplied by the frequency. Since these are negative values they will be actually added.

- (3) Add the sum of the numbers in the first quadrant; subtract the sum of the products of the integral parts of the relative deviations by the frequency in the second quadrant; subtract the sum of the products of the subject deviations of he third quadrant multiplied by their frequency.
- (4) Divide the algebraic sum of (1), (2), and (3) by the number of variates, and from the quotient subtract the product of the complement-fractional parts of the mean value of the subject and relative.

To get ρ , divide $\frac{\sum x_1 x_1 f}{n}$ by the product of σ_1 and σ_2 .

The probable error of the determination of ρ is

$$P.E._{\rho} = \frac{0.6745(1-\rho^2)}{\sqrt{n(1+\rho)}}.$$

Example. Correlation in number of Müllerian glands on right and left legs of 2000 male swine.

Me	an, r	ight	leg,	. = 8	3 .546	5;	Me	an, l	eft le	eg, =	= 3.8	5395
Ċ	7 1			= :	1.719	5;	C	7 2		=	= 1.7	7304
	Right	t leg	z, su	bjec	t:	L	eft le	eg, r	elativ	7e.		
X_2	-	- 3	_ 2	- 1	0	0	1	2	3	4	5	6
Rel.	class	. 0	1	2	3	4	5	6	7	8	9	10
Sub.	class	(I)				ί						(II)
	X_1											
0 -	- 3	8	5	2								
1 -	- 2	4	151	58	9	3						
2 -	- 1	2	65	154	96	28	7	1				
3	0		14	88	173	128	28	6				
4	0	-	5	27	119	153	77	26	3	1		
5	1		1	7	24	92	101	52	11	9		
6	2				8	16	58	48	16	7		2
7	3				1	8	20	18	17	9	5	
8	4					1	3	5	3	2	2	
9	5						1	3	3	2	2	1
10	6 (1	II)				1					1	(VI)

Spurious Correlation in Indices.

When two characters A and B are measured in each individual of a series of individuals, and each absolute magnitude is transformed into an index by dividing it by the magnitude of a third character C as found in the same individual, a spurious correlation will be found to exist between the indices of $\frac{A}{C}$ and $\frac{B}{C}$

Let
$$v_1$$
 = the coefficient of variation of A ;
 v_2 = " " " " B ;
 v_3 = " " " " C ;
 p_0 = " " spurious correlation.

$$\rho_0 = \frac{v_3^2}{\sqrt{v_1^2 + v_2^2} \sqrt{v_2^2 + v_2^2}}.$$

The precise method of using ρ_0 in modifying any determination of ρ is uncertain. Pearson recommends using $\rho - \rho_0$ as the true measure of "organic correlation" in the case of indices.

HEREDITY.

Heredity is a certain degree of correlation between the abmodality of parent and offspring. The statistical laws of heredity deal not with relations between one descendant and

its parent or parents, but only with mean progeny of mean parents. Any group of selected parents is called a parentage, the progeny of a parentage is called a fraternity.

In uniparental inheritance, as in budding or asexual generation, heredity of any character is measured by the coefficient of correlation between the abmodality in a parentage and the abmodality of the corresponding fraternity. More strictly, since the variability of the character in the second generation, σ_2 , may (as a result of selection or of environmental change) be different from the variability of the character in the first generation, σ_1 , the index should be taken as

$$\rho \frac{\sigma_1}{\sigma_2}$$
.

The probable error of this determination is $\frac{.6745\sigma_1}{\sigma_2}\sqrt{\frac{1-\rho_{12}}{n}}$, in which ρ_{12} means the correlation coefficient between the filial character and that of the single parent under consideration,

The variability of the fraternity is to variability of offspring in general as $\sqrt{1-\rho^2}$ is to 1.

In biparental inheritance, if there is no evidence of assortative mating, or correlation between the two parents in the character in question, the mean abmodality of any fraternity will be

$$h_1 = \rho_3 \frac{\sigma_1}{\sigma_2} h_2 + \rho_2 \frac{\sigma_1}{\sigma_3} h_3,$$

where $h_1 = \text{average abmodality of fraternity}$;

 h_2 = average abmodality of male parent;

 h_1 = average abmodality of female parent;

 $\rho_1 = \text{correlation coefficient between fraternity and }$ female parent;

 $\rho_1 = \text{correlation coefficient between fraternity and male parent;}$

 $\sigma_1 = \text{standard deviation of fraternity};$

 σ_2 = standard deviation of male parent;

 σ_{i} = standard deviation of female parent.

When assortative mating occurs, as is usually case, the abmodality of a fraternity is given by

$$h_1 = \frac{\rho_2 - \rho_1 \rho_2}{1 - \rho_1^2} \cdot \frac{\sigma_1}{\sigma_2} h_2 + \frac{\rho_2 - \rho_1 \rho_3}{1 - \rho_1^2} \cdot \frac{\sigma_1}{\sigma_2} h_3$$

where ρ_1 = correlation between male and female parents. The other letters have the same signification as before.

The strength of heredity in assortative mating is measured by the formula

$$\frac{\rho_1-\rho_1\rho_2}{1-\rho_1^2}\cdot\frac{\sigma_1}{\sigma_2}$$

Galton ('97) has shown that an individual inherits not only from his parents, but also from his grandparents, great-grandparents, and so on. The heritage from his 2 parents together is, on the average, 50% or $\frac{1}{2}$ of the whole; from the 4 grandparents 25% or $\frac{1}{4}$; from the 8 great-grandparents 12.5% or $\frac{1}{6}$; from the nth ancestral generation $\frac{1}{2^n}$ of the whole; the total heritage adding up 100%. This law has been generalized by Pearson ('98) as follows:

$$h_1 = \frac{1}{2} \frac{\sigma_0}{\sigma_1} k_1 + \frac{1}{4} \frac{\sigma_0}{\sigma_2} k_3 + \frac{1}{8} \frac{\sigma_0}{\sigma_3} k_3 + \frac{1}{16} \frac{\sigma_0}{\sigma_4} k_4 + \dots$$

where $h_1 = \text{average abmodality of fraternity.}$

 $\sigma_0 = \text{standard deviation of fraternity.}$

 $\sigma_1, \ \sigma_2 \dots \sigma_s =$ standard deviation of mid-parent of 1st, 2d ... sth ancestral generation.

 $k_1 =$ abmodality of mid-parent of 1st ancestral generation.

 k_3 , k_3 ... k_4 = abmodality of mid-parent of 2d, 3d ... sth ancestral generation.

The abmodality of the mid-parent of any degree of ancestry may be taken as the average abmodality of all the contributory ancestors of that generation.

CHAPTER V.

SOME APPLICATIONS OF STATISTICAL BIOLOGICAL STUDY.

The Laws of Variation. Darwin and others have formulated certain laws of variation, such as the law that specific characters are more variable than generic ones; that highly aberrant characters are more variable than more usual ones; that males are more variable than females. These laws can be established only by a determination of the Index or Coefficient of Variation in critical cases.

The causes of variation can be determined only by r quantitative study of the relation between specific change and environmental change, or a knowledge of the degree and frequency of sports.

The effect of selection in causing a greater death rate on one side of the mean than on the other side—the production of skewness—requires the quantitative method for its complete study. The change in the mode and in the index of skewness measures the progress of the effect of selection.

The origin of species through geographical segregation can be studied by the determination of place-modes; that is, the modal condition of specific characters of one and the same species in various localities. The progress of specific differentiation will be measured by the change in place-modes from decade to decade, or by the formation of a binomial curve in the place of a modal one; and by the gradual separation of the two modes of a binomial curve.

The definition of species may be improved by being rendered more quantitative. The relative importance of the various criteria used in separating species may be determined by finding that character in which there is least intergrading between the modal condition characteristic of the two races. Thus if for two species or varieties of birds both total length and form of bill show two modes, the better criterion is that in which the modes are farthest apart or in which the intergrades are fewest.

A basis for an arbitrary distinction between species and varieties may be gained by determining a degree of divergence and of isolation which shall be used to distinguish the two. A degree of divergence of thrice the standard deviation has been suggested as a convenient line between species and varieties.

Quantitative studies in correlation will give us new criteria for homology by telling us the relative morphogenetic kinship of the parts of the body.

Quantitative studies in heredity will give definitive information on **prepotency** of sex or race. By examining hybrids quantitatively and comparing them with their parents we shall unravel the laws of inheritance in cross-breeding and the principles of mixing characters in biparental inheritance.

In a word, by the use of the quantitative method biology will pass from the field of the speculative sciences to that of the exact sciences.

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EXPLANATION OF TABLES.

- I. Formulas. In this table the principal formulas used in the calculation of curves are brought together for convenient reference. The meanings of the letters are explained in the text.
- II. Certain constants and their logarithms. This table includes the constants most frequently employed in the calculations of this book.
- III. Table of ordinates of normal curve. This table is for comparison of a normal frequency polygon consisting of weighted ordinates with the theoretical curve.

Example: M = 14.157; $\sigma = 0.604$; $1y_0 = 1255$. (See page 19.)

IV. Table of values of probability integral. This table is for comparison of a normal frequency polygon consisting of rectangles with the theoretical curve.

Example: M. 5.24; $\sigma = 0.987$. (See page 12).

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In the example, the curve of which is shown in Fig. 22, the frequency between the limits is given in column f; the frequency reduced to percents in column headed %. The $\frac{x}{\sigma}$ of the limit is found and the entries in Table IV corresponding to the quotient are taken. These are added in pairs as indicated, one above and one below the mean, and the sum is compared with the sum of the observed cases within those limits (in italic figures). The closeness of agreement indicates the closeness with which the observed frequency follows the normal frequency.

V. Table of log Γ functions of q. This table will enable one to solve the equations for y_0 given on page 23. The table gives the logarithms of the values of Γ functions only within the range p=1 to 2. As all values of the function within these limits are less than 1, the mantissa of the logarithms is -1; but it is given in the table as 10-1=9, as is usually done in logarithmic tables.

Supposing the quantity of which we wish to find the value reduced to the form $\Gamma(4.273)$. The value cannot be found directly because the value of p is larger than the numbers in the table (1 to 2). The solution is made by aid of the equation $\Gamma(p+1) = p\Gamma(p)$, thus:

$$\log \Gamma(1.273) = 9.955185$$

$$\log 1.273 = 0.104828$$

$$\log \Gamma(2.273) = 0.060013$$

$$\log 2.273 = 0.356599$$

$$\log \Gamma(3.273) = 0.416612$$

$$\log 3.273 = 0.514946$$

$$\log \Gamma(4.273) = 0.931558$$
or, more briefly,
$$\log \Gamma(1.273) = 9.955185$$

$$\log 1.273 = .104828$$

$$\log 2.273 = .356599$$

$$\log 3.273 = .514946$$

$$\log \Gamma(4.273) = 0.931558 = \log 8.542$$

VI. Table of reduction from the common to the metric system. This is given first for whole inches from 1 to 99 excepting even tens, which may be got from the first line of figures by shifting the decimal point one place to the right. The table may be used for hundredths of an inch by shifting the decimal point two places to the left. Other fractions than decimals are given in the lower tables.

VII. First to sixth powers of integers from 1 to 30. This table is useful in calculating moments.

VIII. Squares, cubes, square roots, and reciprocals of numbers from 1 to 1054. The use of this table can be extended by using the principle that if any number be multiplied by n, its square is multiplied by n^2 , its cube by n^2 , and its reciprocal by $\frac{1}{n}$.

IX. Logarithms of numbers to six places. The following explanation of the use of the logarithmic tables is taken from Searles' Field Engineering, pp. 257-263 [ed. 1887].

APPENDIX IX.—The logarithm of a number consists of two parts, a whole number called the *characteristic*, and a decimal called the *mantissa*. All numbers which consist of the same figures standing in the same order have the same mantissa, regardless of the position of the decimal point in the number, or of the number of ciphers which precede or follow the significant figures of the number. The value of the characteristic depends entirely on the position of the decimal point in the number. It is always one less than the number of figures in the number to the left of the decimal point. The value is therefore diminished by one every time the decimal point of the number is removed one place to the left, and view versa. Thus

Number.	Logarithm.
13840.	4.141136
1384.0	3,141136
138.40	2.141136
13.84	1.141136
1.384	0.141136
.1384	-1.141136
.01384	-2.141136
.001384	3.141136
etc.	etc.

The mantissa is always positive even when the characteristic is negative. We may avoid the use of a negative characteristic by arbitrarily adding 10, which may be neglected at the closs of the calculation. By this rule we have

Number.	Logarithm
1.384	0.141136
.1384	9.141136
.01384	8.141136
.001384	7.141136
etc.	etc.

No confusion need arise from this method in finding a number from its logarithm; for although the logarithm 6.141136 represents either the number 1,384,000, or the decimal .0001384, yet these are so diverse in their values that we can never be uncertain in a given problem which to adopt.

The table IX. contains the mantissas of logarithms, carried to six places of decimals, for numbers between 1 and 9999, inclusive. The first three figures of a number are given in the first column, the fourth at the top of the other columns. The first two figures of the mantissa are given only in the second column, but these are understood to apply to the remaining four figures in either column following, which are comprised between the same horizontal lines with the two.

If a number (after cutting off the ciphers at either end) consists of not more than four figures, the mantissa may be taken direct from the table; but by interpolation the logarithm of a number having six figures may be obtained. The last column contains the average difference of consecutive logarithms on the same line, but for a given case the difference needs to be verified by actual subtraction, at least so far as the last figure is concerned. The lower part of the page contains a complete list of differences, with their multiples divided by 10.

To find the logarithm of a number having six figures:—Take out the mantissa for the four superior places directly from the table, and find the difference between this mantissa and the next greater in the table. Add to the mantissa taken out the quantity found in the table of proportional parts, opposite the difference, and in the column headed by the fifth figure of the number; also add $\frac{1}{10}$ the quantity in the column headed by the sixth figure. The sum is the mantissa required, to which must be prefixed a decimal point and the proper characteristic.

Example.—Find the log of 23.4275.

For	2342	mar	ıtissı	a is	369587
"	diff.	185	col.	7	129.5
"	"	"	"	5	9.2

Ans. For 23.4275 log is 1.369726

The decimals of the corrections are added together to determine the nearest value of the sixth figure of the mantissa.

To find the number corresponding to a given logarithm.—If the given mantissa is not in the table find the one next less, and take out the four figures corresponding to it; divide the difference between the two mantissas by the tabular difference in that part of the table, and annex the figures of the quotient to the four figures already taken out. Finally, place the decimal point according to the rule for characteristics. prefixing or annexing ciphers if necessary. The division required is facilitated by the table of proportional parts, which furnishes by inspection the figures of the quotient.

Example.—Find the number of which the logarithm is 8.263927 8.263927 263873

First 4 figures 1836 from

Tabular diff. = 236	Diff. \cdot 5th fig. = 2	54.0 47.2
	6th fig. = 3	6.80 7.08

Ans. No. = .0183628 or 183,623,000.

The number derived from a six-place logarithm is not reliable beyond the sixth figure.

At the end of table XXIV. is a small table of logarithms of numbers from 1 to 100, with the characteristic prefixed, for easy reference when the given number does not exceed two digits. But the same mantissas may be found in the larger table.

Appendix X.—The logarithmic sine, tangent, etc. of an arc is the logarithm of the natural sine, tangent, etc. of the same arc, but with 10 added to the characteristic to avoid negatives. This table gives log sines, tangents, cosines, and cotangents for every minute of the quadrant. With the number of degrees at the left side of the page are to be read the minutes in the left-hand column; with the degrees on the right-hand side are to be read the minutes in the right-hand column. When the degrees appear at the top of the page the top headings must be observed, when at the bottom those at the bottom. Since the values found for arcs in the first quadrant are duplicated in the second, the degrees are given from 0° to 180°. The differences in the logarithms due to a change of one second in the arc are given in adjoining columns.

To find the log.sin, cos, tan, or cot of a given arc.: Take out from the proper column of the table the logarithm corresponding to the given number of degrees and minutes. If there be any seconds multiply them by the adjoining tabular difference, and apply their product as a correction to the logarithm already taken out. The correction is to be added if the logarithms of the table are increasing with the angle, or subtracted if they are decreasing as the angle increases. In the first quadrant the log sines and tangents increase, and the log cosines and cotangents decrease as the angle increases.

Example.—Find the log sin of 9° 28′ 20′.

Log sin of 9° 28′ is 9.216097
Add correction 20 × 12.62 252

Ans. 9.216349

Example.—Find the log cot of 9° 28′ 20′.

Log cotan of 9° 28′ is 10.7777948
Subtract correction 20 × 12.97 259

Ans. 10.777689

To find the angle or are corresponding to a given logarithmic sine, tangent, cosine, or cotangent.—If the given logarithm is found in the proper column take out the degrees and minutes directly; if not, find the two consecutive logarithms between which the given logarithm would fall, and adopt that one which corresponds to the least number of minutes; which minutes take out with the degrees, and divide the difference between this logarithm and the given one by the adjoining tabular difference for a quotient, which will be the required number of seconds.

With logarithms to six places of decimals the quotient is not reliable beyond the tenth of a second.

Example. -9.383731 is the log tan of what angle? Next less 9.383682 gives 13° 86′ Diff. $49.00 \div 9.20 =$ 05".3 13° 36′ 05'.3 Ans. Example. —9.249348 is the log cos of what angle? 583 gives 79° 46' Next greater Diff. 235 + 11.67 =20".1 79° 46' 20".1

The above rules do not apply to the first two pages of this table (except for the column headed cosine at top) because here the differences vary so rapidly that interpolation made by

them in the usual way will not give exact results.

On the first two pages, the *first* column contains the number of seconds for every minute from 1' to 2°; the minutes are given in the *second*, the log. sin. in the *third*, and in the *fourth* are the last three figures of a logarithm which is the difference between the log sin and the logarithm of the number of seconds in the first column. The first three figures and the characteristic of this logarithm are placed, once for all, at the head of the column.

To find the log sin of an arc less than 2° given to seconds.—Reduce the given arc to seconds, and take the logarithm of the number of seconds from the table of logarithms, and add to this the logarithm from the fourth column opposite the same number of seconds. The sum is the log sin required.

The logarithm in the fourth column may need a slight interpolation of the last figure, to make it correspond closely to the given number of seconds.

Example.—Find the log sin of 1° 39′ 14″.4.

1° 89′ 14″.4 = 5954″.4 log 8.774898 add (q-l) 4.685515

Ans. log sin 8.460853

Log tangents of small arcs are found in the same way, only taking the last four figures of (q - l) from the fifth column.

Example.—Find the log tan of 0° 52′ 35″.

52' 85' = (3120' + 35') = 3155'
$$\log s.498999$$
 add $(q - l)$ 4.685609

Ans. log tan 8.184608

To find the log cotangent of an angle less than 2° given to seconds.—Take from the column headed (q+l) the logarithm corresponding to the given angle, interpolating for the last figure if necessary, and from this *subtract* the logarithm of the number of seconds in the given angle.

Example.—Find the log cotan of 1° 44' 22".5.

These two pages may be used in the same way when the given angle lies between 88° and 92°, or between 178° and 180°; but if the number of degrees be found at the bottom of the page, the title of each column will be found there also; and if the number of degrees be found on the right hand side of the page, the number of minutes must be found in the right hand column, and since here the minutes increase upward, the number of seconds on the same line in the first column must be diminished by the odd seconds in the given angle to obtain the number whose logarithm is to be used with $(q\pm l)$ taken from the table.

Example.—Find the log cos of 88° 41' 12".5

$$4740'' - 12''.5 = 4727.5$$
 $(q - l) 4.685537$ $\log 3.674631$

Ans. 8.360168

Example.—Find the log tan of 90° 30′ 50″.

$$1800' + 50' = 1850'$$

$$q + l 15.314413$$

$$log 8.267172$$

$$Ans. 12.047241$$

To find the arc corresponding to a given log sin, cos, tan, or cotan which falls within the limits of the first two pages of Table X.

Find in the proper column two consecutive logarithms between which the given logarithm falls. If the title of the given function is found at the top of that column read the degrees from the top of the page; if at the bottom read from the bottom.

Find the value of (q-l) or (q+l), as the case may require, corresponding to the given log (interpolating for the last figure if necessary). Then if q = given log and l = log of number of seconds, n, in the required arc, we have at once l = q - (q - l) or l = (q+l) - q, whence n is easily found.

Find in the first column two consecutive quantities between which the number n falls, and if the degrees are read from the lest hand side of the page, adopt the less, take out the minutes from the second column, and take for the seconds the difference between the quantity adopted and the number n. But if the degrees are read from the right hand side of the page, adopt the greater quantity, take out the minutes on the same line from the right-hand column, and for the seconds take the difference between the number adopted and the number n.

```
Example.—11.734268 is the log cot of what arc?
                                                15.314376
                                                11.734268
    q
                                                 3.580108
                  3802.8
  For 1° adopt
                  3780.
                            giving 03'
  Difference
                    22".8
Ans. 1° 03' 22'.8 or 178° 56' 37'.2.
Example.—8.201795 is the log cos of what arc?
  q - l
                                                 4.685556
                                                 8.201795
    q
                                                 3.516239
  For 89° adopt
                   8300.
                            giving 05'
                     17".2
  Difference
Ans. 89° 05′ 17".2 or 90° 54′ 42".8.
```

I.-FORMULAS.

$$\begin{split} \mathbf{M} &= \frac{\mathbf{Z}(V, f)}{n} = V_m - \nu_1. & P.E._{\underline{M}} = \pm 0.6745 \frac{\sigma}{\sqrt{n}}. & x = V - \mathbf{M}, \\ \sigma &= \sqrt{\frac{\mathbf{Z}(x^3, f)}{n}} = \sqrt{\nu_2 - \nu_1^3} = \sqrt{\mu_2}. & P.E._{\sigma} = 0.6745 \frac{\sigma}{\sqrt{2n}}. \\ AD &= \frac{\mathbf{Z}(x, f)}{n} = 0.7979\sigma. & P.E. = q = 0.6745\sigma. \\ \nu_1 &= \frac{\mathbf{Z}(V - V_m)}{n} = M - V_m. & \nu_2 &= \frac{\mathbf{Z}(V - V_m)^2}{n}. \\ \nu_3 &= \frac{\mathbf{Z}(V - V_m)^3}{n}. & \nu_4 &= \frac{\mathbf{Z}(V - V_m)^4}{n}. \\ \mu_2 &= \nu_2 - \nu_1^2(+\frac{1}{6}) = \frac{\mathbf{Z}(x^3, f)}{n}(+\frac{1}{6}). \\ \mu_3 &= \nu_3 - 3\nu_1\nu_3 + 2\nu_1^3 = \frac{\mathbf{Z}(x^3, f)}{n}. \\ \mu &= \nu_4 - 4\nu_1\nu_3 + 6\nu_1^2\nu_3 - 3\nu_1^4(+\nu_3 - \nu_1^2 + \frac{1}{18}) = \frac{\mathbf{Z}(x^4, f)}{n}\left(+\frac{\mathbf{Z}(x^3, f)}{n} + \frac{1}{16}\right). \\ \beta_1 &= \frac{\mu_2^2}{\mu_3^3}. & \beta_2 &= \frac{\mu_4}{\mu_2^3}. \\ F &= 6 + 3\beta_1 - 2\beta_2. & s &= \frac{6(\beta_2 - \beta_1 - 1)}{F}. \\ A &= y_4 \sqrt{\beta_1^3 \cdot \frac{8 \pm 2}{n - 2}}. & d &= \sigma, A. \end{split}$$

 $\Delta \%$ (for graduated variates) = $\frac{2\delta_1 + 2(-\delta_2)}{2n}$. 100%.

 Δ % (for integral variates) = $\Sigma \frac{\delta}{f \cdot k}$. 100%, where k equals the number of classes.

$$\begin{split} & \rho = \frac{\mathbb{E}(\text{dev. } x \cdot \text{dev. } y \cdot f)}{n\sigma_1\sigma_2} = \frac{\mathbb{E}X_1X_2f}{n\sigma_1\sigma_2}, \\ & \frac{\mathbb{E}fX_1X_2}{n} = \frac{\mathbb{E}_{I-IV}(fX_1X_2) - \mathbb{E}_{I}(fX_1) - \mathbb{E}_{I}(fX_2) + \mathbb{E}_{I}(f) - \mathbb{E}_{II}(fX_2) - \mathbb{E}_{III}(fX_1)}{n} - \xi_1\xi_2, \\ & P.E._{\rho} = \frac{0.6745(1-\rho^2)}{\sqrt{n(1-\rho^2)}}. \end{split}$$

 $\rho_0 \text{ (spurious correlation)} = \frac{v_3^2}{\sqrt{v_1^2 + v_3^2} \sqrt{v_2^2 + v_3^2}}$

h (index of heredity, uniparental inheritance) = $\rho \frac{\sigma_1}{\sigma_1}$.

$$P.E_{h} = \frac{.6745\sigma_{1}}{\sigma_{2}} \sqrt{\frac{1-\rho_{12}^{2}}{n}}.$$

 $h_1 = \rho_3 \frac{\sigma_1}{\sigma_2} h_2 + \rho_3 \frac{\sigma_1}{\sigma_2} h_2$ [biparental inheritance; unassortative mating].

$$h_1 = \frac{\rho_2 - \rho_1 \rho_2}{1 - \rho_1^2} \cdot \frac{\sigma_1}{\sigma_2} h_2 + \frac{\rho_2 - \rho_1 \rho_2}{1 - \rho_1^2} \cdot \frac{\sigma_1}{\sigma_2} \cdot h_3 \quad \text{[biparental inheritance; assortative mating]}.$$

II.—CERTAIN CONSTANTS AND THEIR LOGARITHMS.

Title.	Symbol	Number.	Log.
Ratio of circumference to diameter	π	3.1415927	0.4971499
Reciprocal of same	1 7	0.3183099	9.5028501
Square root of same	√ π	1.7724538	0.2485749
Reciprocal of square root of same	1/1	0.5641896	9.7514251
Square root of 2#	l '_	2.506628	0.899090
Reciprocal of same	$\frac{1}{4\sqrt{2\pi}}$	0.3989422	9.6009100
Base of hyperbolic logarithms	1 '	2.7182818	0.4842945
Modulus of common system of logs $= \log \epsilon \dots$	กเ	0.4842945	9.6377843
Reciprocal of same = hyp. log 10	$\frac{1}{m}$	2.3025851	0.3622157
Com. $\log x = m \times \text{hyp. } \log x$, or			
Com.log(com.log(x) = 9.6377843 + com.log(hyp.log(x))			
Hyp. $\log x = \text{com. } \log x \times \frac{1}{m}$, or			
$ Com_{\log}(hyp_{\log}x) = com_{\log}(com_{\log}x) + 0.3622157$			
Circumference of circle =	2=7		
Area of circle	ML3		,
Area of sector (length of arc = l)	ا سا		
Area of sector (angle of arc = a°)	$\frac{a}{360}\pi r^2$		
$\sqrt{a^3-b^3}$	•	'	ļ

Eccentricity of an ellipse, $\epsilon = \sqrt{\frac{a^3 - b^3}{a^3}}$, where a=semi-major axis; b=semi-minor axis of ellipse.

III.—TABLE OF ORDINATES OF NORMAL CURVE, OR VALUES OF $\frac{y}{y_0}$ CORRESPONDING TO VALUES OF $\frac{x}{\sigma}$.

x =deviation from mean. y =frequency.

 $\sigma={
m standard\ deviation.}$ $y_0=rac{\alpha}{\sigma\ \sqrt[4]{2\pi}}={
m maximum\ frequency.}$

<i>x</i> /σ	y/y ₀	<i>x</i> /σ	ν/ν•	x /σ	y/yo	x/σ	y/yo
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7	1. .9950 .9802 .9560 .9281 .8825 .8353 .7827	0.8 0.9 1.0 1.1 1.2 1.3 1.4	.7262 .6670 .6065 .5467 .4868 .4286 .3758 .3246	1.6 1.7 1.8 1.9 2.0 2.2 2.4 2.6	.2780 .2857 .1979 .1645 .1358 .0889 .0661 .0840	2.8 3.0 8.2 3.4 8.6 3.8 4.0 5.0	.0198 .0111 .0060 .0081 .0015 .0007 .0008

IV.—TABLE OF VALUES OF THE NORMAL PROBABILITY INTEGRAL CORRESPONDING TO VALUES OF $\frac{x}{\sigma}$; OR THE FRACTION OF THE AREA OF THE CURVE BETWEEN THE LIMITS 0 AND $+\frac{x}{\sigma}$ OR 0 AND $-\frac{x}{\sigma}$.

Total area of curve assumed to be 10000.

x =deviation from mean.

 $\sigma =$ standard deviation.

# #	0	1	2	8	4	5	6	7	8	9	Δ
0.0	0000	0040	0080	0120	0160	0200	0289	0279	0319	0359	40
0.1	0399	0438	0478	0517	0557	0597	0686	0676	0715	0754	40
0.2	0793	0832	0871	0910	0948	0987	1026	1064	1103	1141	89
0.8	1179	1217	1255	1293	1380	1368	1406	1448	1480	1517	38
0.4	1554	1591	1628	1664	1700	1787	1778	1808	1844	1879	36
0.5	1915	1950	1985	2020	2054	2089	2124	2157	2191	2225	84
0.6	2258	2291	2824	2857	2389	2422	2454	2486	2518	2549	32
0.7	2581	2612	2648	2672	2704	2734	2764	2794	2823	2853	80
0.8	2882	2910	2939	2967	2995	8028	8051	3078	8106	3133	28
0.9	8160	8186	8212	3238	3264	8290	3315	8840	8865	8389	26
1.0	8414	8438	3461	8485	3509	3532	3555	8577	3600	3622	23
1.1	8644	8665	8686	3708	3729	8750	3770	8791	3811	3830	21
1.2	8850	3869	8888	8906	3925	8944	8962	3980	3997	4015	19
1.8	4082	4049	4066	4088	4099	4115	4132	4147	4162	4178	17
1.4	4198	4208	4222	4287	4251	4265	4279	4292	4306	4319	14
	4882	4845	4358	4370	4388	4895	4406	4440	4429	4441	۱.,
1.5 1.6	4452	4463	4474	4485	4496	4506	4516	4418 4526	4586	4545	12 10
1.7	4554	4564	4578	4582	4490 4591	4600	4608	4617	4625	4633	10
1.8	4641	4648	4656	4664	4671	4678	4686	4693	4700	4706	7
1.9	4718	4720	4726	4732	4788	4744	4750	4756	4762	4767	6
1.5	3110	\$120	4120	4100	2100	4144	4100	4100	4104	2101	ľ
2.0	4778	4778	4783	4788	4794	4799	4804	4808	4813	4817	5
2.1	4822	4826	4830	4834	4838	4842	4846	4850	4854	4858	4
2.2	4861	4865	4868	4872	4875	4878	4881	4884	4887	4890	8
2.8	4898	4896	4899	4901	4904	4906	4909	4911	4914	4916	8
2.4	4918	4921	4928	4925	4927	4929	4931	4983	4935	4936	2
2.5	4988	4940	4942	4943	4945	4946	4947	4949	4951	4952	2
2.6	4958	4955	4956	4958	4959	4960	4961	4962	4964	4965	2
2.7	4966	4967	4968	4969	4970	4970	4971	4972	4973	4974	1
2.8	4975	4975	4976	4977	4978	4978	4979	4980	4981	4981	0.5
2.9	4982	4982	4983	4983	4984	4984	4985	4985	4986	4986	0.5
8	4987	4991	4993	4995	4997	4998	4999	4999	4999	5000	
80	5000	2001				1000			****		l

V.—TABLE OF LOG Γ FUNCTIONS OF p.

p	. 0	1	2	8	4	5	6	7	8	9
1.00		9750	9500	9 6251	9003	8755	8509	8263	8017	7778
1.01	9.997529	7285	7043	6801	6560	6320	6080	5841	5602	5865
1.02	5128	4892	4656	4421	4187	3953	3721	3489	3257	3026
1.03	2796	2567	2338	2110	1883	1656	1430	1205	0981	0775
1.04	0538	0811	0089	6868	9 647	9427	6208	§989	8772	8554
1.05	9.988338	8122	7907	7692	7478	7265	7052	6841	6629	6419
1.06 1.07	6209 4145	6000 3943	5791 3741	5583 8589	5378 3338	5169 3138	4963 2939	4758 2740	4553 2541	4349 2344
1.08	2147	1951	1755	1560	1365	1172	0978	0786	0594	0403
1.09	0212	0022	683 8	ĝ64 4	9456	6269	6082	8900	8710	ĝ525
1.10	9.978341	8157	7974	7791	7610	7428	7248	7068	6888	6709
1.11	6581	6354	6177	6000	5825	5650 3982	5475	5301	5128	4955
1.12 1.13	4783 3096	4612 2931	4441 2766	4271 2602	4101 2438	2275	8764 2118	3596 1951	8429 1790	8262 1629
1.14	1469	1309	1150	0992	0835	0677	0521	0365	0210	0055
1.15	9.969901	9747	9594	9442	9290	9189	8988	8838	8688	8589
1.16	8390	8243	8096	7949	7803	7658	7513	7869	7225	7082
1.17	6939	6797 5408	6655	6514	6374	6234 4868	6095	5957	5818	5681
1.18 1.19	5544 4205	4075	5272 3944	5137 881 5	5002 3686	3557	4734 3429	4601 3802	4469 8175	4337 8048
1.20	2922	2797	2672	2548	2425	2302	2179	2057	1936	1815
1.21	1695	1575	1456	1337	1219	1101	0984	0867	0751	0686
1.22	0521	0407	0293	0180	0067	9955	8843	9782	9621	9511
1.23 1.24	9.959401 8335	9292 8231	9184 8128	9076 8025	8968 7923	8861 7821	8755 7720	8649 7620	8544 7520	8439 7420
1.25	7321	7223	7125	7027	6930	6834	6738	6642	6547	6453
1.26	6359	6267	6173	6081	5989	5898	5807	5716	5627	5587
1.27	5449	5360	5278	5185	5099	5013	4927	4842	4757	4678
1.28	4589 8780	4506 3702	4428 8624	4341 8547	4259 8470	4178 8394	4097 8318	4017 8248	3938 3168	3858 3094
								5.000		
1.30	8020	2947 2242	2874	2802	2730	2659	2588	2518	2448	2379
1.81 1.32	2810 1648	1585	2174 1522	2106 1459	2040 1397	1973 1336	1907 1275	1842 1214	1777 1154	1712 1094
1.33	1035	0977	0918	0861	0803	0747	0690	0634	0579	0524
1.34	0470	0416	0363	0309	0257	0205	0158	0102	0051	0001
1.35	9.949951	9902	9853	9805	9757	9710	9663	9617	9571	9525
1.36	9490	9435	9391	9348	9304 8898	9262 8859	9219 8822	9178	9186	9095
1.37 1.38	9054 8676	9015 8640	8975 8605	8936 8571	8587	8503	8470	8785 8437	8748 8405	8711 8378
1.39	8342	8811	8280	8250	8221	8192	8163	8135	8107	8060
1.40	8053	8026	8000	7975	7950	7925	7901	7877	7854	7881
1.41	7808	7786	7765	7744	7723	7703	7683	7664	7645	7626
1.42 1.48	7608 7451	7590 7488	7573 7425	7556 7413	7540 7401	7524 7389	7509 7378	7494 7368	7479 7858	7465 7348
1.44	7451 7338	7329	7321	7312	7305	7298	7291	7284	7278	7273
1.45	7268	7268	7259	7255	7251	7248	7246	7244	7242	7241
1.46	7240	7239	7239	7240	7241	7243	7243	7245	7248	7251
1.47	7254	7258	7262	7266	7271	7277	7282	7289	7295	7302
1.48 1.49	7310 7407	7317 7419	7326 7431	7834 7444	7348 7457	7353 7471	7863 7485	7878 7499	7384 7515	7395 7529
1.75	1401	1,419	1401	1224	1401	1417	1400	1458	1010	1068

TABLE OF LOG Γ FUNCTIONS.

V.—TABLE OF LOG r FUNCTIONS OF p.

1.50					Ī					1	Ī
1.81	p	0	1	2	8	4	5	6	7	8	9
1.51								<u> </u>		<u></u>	
1.51	1.50	0 047848	7561	7577	7594	7612	7629	7847	7666	76%	7704
1.53	1.51	7724	7744	7764	7785	7806	7828	7850	7873	7896	7919
1.54											8174 8468
1.56											8802
1.56	1.55	8837	8873	8910	8946	8988	9021	9059	9097	9185	9174
1.56	1.56			9294							9586
1.59											6035 0522
1.61	1.59		0624								1047
1.62	1.60	1102	1157								1610
1.66											2209
1.64											2845 3517
1.66											4226
1.67 5880 5911 5991 6072 6154 6285 6317 6400 6896 7070 7070 7157 7243 7392 74 1.69 7808 7690 7678 7766 7854 7793 8082 8122 8211 83 1.70 8391 8482 8573 8664 8756 8848 8941 9034 9127 92 1.71 9814 9409 9502 9598 993 9783 9884 9980 6077 6161 11 1.73 1960271 0660 4067 0665 0664 0763 0662 0961 1061 11 1.73 1976 2079 21 1.74 2287 2391 2496 2601 2706 2812 2918 8024 3131 32 1.75 3845 3453 3561 3679 4770 4892 3998 5904 5107 5290 5333 54 </th <th>1.65</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>4970</th>	1.65										4970
1.68 6849 6733 6817 6901 6986 7072 7157 7243 7392 74 1.69 7503 7590 7678 7766 7854 7943 8092 8122 8211 83 1.70 8391 8482 8573 8664 8756 8848 8941 9034 9127 92 1.71 9960271 0899 0467 0865 0664 0763 0862 0961 1061 11 173 1982 1383 1464 1566 1668 1770 1873 1976 2079 21 1.74 2287 2391 2496 2201 2706 2812 2918 2049 3131 32 1.75 3436 3458 3561 3669 3778 3887 3996 4103 4215 43 1.77 6561 5675 5789 5004 6019 6185 6251 6367 6484 661 778 </th <th></th> <th>5047</th> <th></th> <th>5201</th> <th>5278</th> <th></th> <th>5484 4098</th> <th>5518</th> <th></th> <th></th> <th>5740 6566</th>		5047		5201	5278		5484 4098	5518			5740 6566
1.69	1.68										7416
1.72	1.69						7943		8122	8211	8301
1.73	1.70										9220
1.78 1962 1963 1464 1566 1668 1770 1873 1976 2079 21 1.74 2287 2391 2496 2601 2706 2812 2918 8024 3131 32 1.76 3845 3453 3561 3669 3778 3887 3996 4105 4215 43 1.77 4436 4567 4679 4770 4882 4994 5107 5220 5333 54 1.77 5561 5675 5789 5904 6019 6135 6251 6367 6484 60 7171 7547 7667 7676 7757 7897 8902 8514 8636 8759 8882 90 1.80 9129 9253 9877 9501 9626 9751 9877 6008 1219 1200 1219 2200 11150 1279 1408 1258 2719 2818 1828 2985 3118	1.71	9814									6174 1162
1.74 2987 2991 2496 2601 2706 2812 2918 3024 3131 32 1.75 3845 3453 3561 3669 3778 3887 3996 4105 4215 43 1.76 4436 4547 4659 4770 4682 4994 5107 5220 5333 54 1.77 5561 5675 5789 5046 6019 6135 6251 6367 6484 66 1.78 6718 6835 6953 7071 7189 7308 7427 7547 7666 77 1.79 7907 8023 8149 8270 8392 8514 8636 8759 8882 90 1.80 1939 9253 9377 7565 6689 7511 9677 6068 8759 8882 90 1.81 9.970388 0509 0637 7575 6683 1021 1150 1279 <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>1976</th> <th></th> <th>2183</th>									1976		2183
1.76					2601	2706	2812	2918	8024	8181	3238
1.77 5561 5675 5789 5004 6019 6135 6251 6886 6484 66 717 7189 7187 6885 6953 7071 7189 7308 7427 7547 7666 77 77 7179 7907 8023 8149 8270 8892 8514 8685 8759 8882 90 1.80 9199 9253 9377 9501 9626 9751 9877 5008 6129 52 1.81 9.970383 0509 0637 0765 0693 1021 1150 1279 1408 15 1.82 1683 1798 1799 2060 2191 2322 2454 2586 2719 28 1.84 4333 4470 4606 4744 4881 5019 5157 5295 5446 4 1.85 5712 5825 5992 6132 6273 6414 6555 6697 6837 </th <th>1.75</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>4326</th>	1.75										4326
1.78 6718 6885 6953 7071 7189 7808 7127 7547 7666 77 1.79 7907 8028 8149 8270 8392 8514 8636 8759 8882 90 1.80 91907 9258 9677 705 6683 1021 1150 1279 1408 6129 1.81 9.970388 0509 0637 0765 6683 1021 1150 1279 1408 15 1.82 1668 1798 1929 2060 2191 2322 2454 2586 2719 28 1.83 2986 3118 3252 3386 3520 3570 3225 4061 444 4881 5019 5157 5295 5434 55 1.85 5712 5832 5992 6132 6273 6414 6555 6697 6838 69 1.86 7123 7866 7408 7552 <th>1.70</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>5447 6600</th>	1.70										5447 6600
1.80 9129 9253 9377 9501 9626 9751 9877 6008 6129 62 181 9.970383 0509 0637 0765 0693 1021 1150 1279 1408 15 1.82 1668 1798 1929 2060 2191 2322 2454 2586 2719 28 1.83 2985 3118 3292 3886 3520 3855 3590 3855 3590 3855 3595 3855 3590 3855 3590 3855 3790 3225 4461 41 1.84 4333 4470 4606 4744 4881 5019 5157 5295 5434 55 1.86 7123 7366 7408 7552 7696 7840 7984 8128 8273 84 1.87 8564 8710 8856 902 9149 9296 9443 9591 9739 98 1.89 1537 1	1.78	67 18	6835	6953	7071	7189	7808	7427	7547	7666	7787
1.61 9.970898 0509 0637 0765 0698 1021 1150 1279 1408 15 1.82 1688 1798 1929 2906 2191 2392 2454 2586 2719 28 1.83 2986 3118 3252 3386 3590 3655 3790 3925 4061 41 1.84 4333 4470 4606 4744 4881 5019 5157 5295 5434 55 1.85 5712 5853 5992 6132 6827 6841 6555 6697 6838 1.86 5712 7296 7408 7552 7696 7840 7984 8128 8273 84 1.87 8564 8710 8856 9002 9149 9296 9143 9591 9739 98 1.88 9.98036 0184 0333 0483 0693 0783 0933 1084 1234 13 1.89 1837 1689 1841 1994 2147 2299 2453 2607 2761 29 1.90 2069 3824 3379 3535 3690 3846 4003 4159 4316 44 1.91 4631 4789 4947 5105 5264 5423 5582 5742 5902 60 1.92 6223 6388 6514 6706 6867 7029 7192 7354 7517 76 1.93 7844 8007 8171 8386 8500 8665 8830 8996 9161 93 1.94 9494 9660 9827 9995 5162 6380 6498 6666 6885 712 1.95 9.991178 1343 1512 1683 1858 2024 2195 2366 2537 2719 2881 2881 3054 3227 3399 3573 3746 3320 4094 4269 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486 4486	1.79	7907	8023	8149	8270	8392	8514	8636	8759	8882	9005
1.89 1688 1798 1929 9060 2191 2892 2454 2586 2719 28 1.84 2838 3118 3252 3886 3520 3655 3790 3925 4061 41 1.84 4333 4470 4606 4744 4681 5019 5157 5295 5434 55 1.85 5712 5832 5992 6132 6273 6414 6555 6697 6838 69 1.86 7123 7866 7408 7552 7696 7840 7984 8128 8273 84 1.87 8564 8710 8856 9002 9149 9296 9443 9591 9739 943 1891 9391 9739 1931 188 183 1083 1083 0833 0783 0933 1084 1234 13 184 134 1994 2147 2299 2453 2607 2761 29											6255
1.83 2985 8118 3252 3886 3890 3855 3790 3925 4061 41 1.84 4333 4470 4606 4744 4881 5019 5157 5295 5434 55 1.85 5712 5852 5992 6273 6414 6555 6897 6838 69 1.86 7123 7966 7408 7552 7696 7840 7984 8128 8273 84 1.87 8564 8710 8856 9002 9149 9296 9143 9591 0739 98 1.89 9.96036 0184 0333 0483 0833 0533 0783 933 1084 1234 134 1894 1341 1994 2147 2299 2453 2607 2761 29 1.90 3069 3824 3379 3535 3690 3846 4003 4159 4316 44 1.91			1209								1536 2852
1.85 5712 5852 5992 6132 6273 6414 65.55 6607 6838 69 1.86 7123 7866 7408 7552 7696 7840 7984 8128 8273 84 1.87 8564 8710 8856 9002 9149 9296 9143 9591 9739 98 1.89 1637 1689 1841 1994 2147 2299 2453 2607 2761 234 1.90 3069 3824 3379 35.95 3690 3846 4003 4159 4316 44 1.91 4631 4789 4947 5105 5284 5642 5582 5742 5902 60 1.92 6223 6833 6514 6706 6867 7029 7192 7354 7517 76 1.92 6223 6836 5514 6706 6867 7029 7192 7354 7517	1.83										4197
1.86 7123 7366 7408 7552 7696 7840 7984 8128 82.3 84 1.87 8564 8710 8856 902 9149 9296 9443 9591 9739 951 9739 1943 9591 9739 1943 1951 9739 1943 188 183 1084 1234 13 188 183 1084 1234 13 188 184 1994 2147 2299 2453 2607 2761 29 1.90 3069 3824 3379 35.95 3690 3846 4003 4159 4316 44 1.92 6223 6888 6344 6706 6867 7029 7192 7354 5592 60 1.93 7844 8007 8171 8386 8500 8655 8830 8996 9161 98 19494 9660 9827 9995 6162 6830 6498 6666	1.84	4333	4470	4606	4744	4881	5019	5157	5295	5434	5573
1.87 8564 8710 8856 9002 9149 9296 9143 9591 9739 98 1.88 9.96036 0184 0383 0483 0633 0783 0933 1084 1234 134 1.89 1587 1689 1841 1994 2147 2299 2453 2607 2761 29 1.90 3060 3824 3379 3535 3690 3846 4003 4159 4316 44 1.91 4631 4789 4947 5105 5284 5423 5582 5742 5902 60 1.92 6223 6383 6514 6706 6867 7029 7192 7157 7517 76 1.93 7844 8007 8171 8386 8500 865 8830 896 9161 98 1.94 9494 9600 9827 9995 5162 6393 6498 5666 5885											6980
1.88 9.96036 0184 0333 0483 0633 0783 0933 1084 1284 138 1.89 1857 1689 1841 1994 2147 2299 2453 2607 2761 29 1.90 3060 3824 3879 3555 3690 3846 5423 5582 5742 5902 40 1.91 4631 4789 4947 5105 5264 5423 5582 5742 5902 60 1.92 6223 6883 6514 6706 6867 7029 7192 7354 7517 76 1.93 7844 8007 8171 8836 8500 8655 8830 8996 9161 93 1.94 9494 9660 9827 9995 5162 5383 5498 5666 5835 10 1.95 9.991178 1348 1512 1683 1853 2024 2195 2366											8419 9887
1.89 1637 1689 1841 1994 2147 2299 2453 2607 2761 29 1.90 3069 3824 3379 3535 3690 3846 4003 4159 4316 44 1.91 4631 4789 4947 5105 5284 5682 5742 5902 600 1.92 6223 6883 6534 6706 6867 7029 7192 7354 7517 76 1.93 7844 9007 8171 8386 8500 8655 8830 8996 9161 93 1.94 9494 9660 9827 9995 6162 6383 6498 6666 6885 1.95 9.991178 1348 1512 1683 1858 2024 2195 2366 2537 27 1.96 2881 3064 3227 3399 3573 3746 3320 4094 4269 44								0933		1234	1386
1.91 4631 4789 4947 5105 5264 5423 5582 5742 5902 600 1.92 6223 6388 6514 6706 6867 7029 7192 7354 7517 786 1.93 7844 8007 8171 8386 8500 8655 889 8996 9161 99 1.94 9494 9660 9827 9995 6162 6330 6498 6666 6835 10 1.95 9.991173 1348 1512 1683 1858 2024 2195 2366 2537 27 1.96 2881 3064 3227 3399 3573 3746 3920 4094 4269 446		1537	1689	1841	1994	2147	2299	2458	2607	2761	2915
1.92 6223 6388 65.44 6706 6867 7029 7192 7854 7517 76 1.93 7844 8007 8171 8386 8500 8665 8830 8996 9161 98 1.94 9494 9660 9827 9995 5162 5300 5498 5666 5835 10 1.95 9.991178 1848 1512 1683 1853 2024 2195 2366 2537 37 1.96 2381 3064 3227 3399 3573 3746 3920 4094 4269 44											4474
1.98 7844 8007 8171 8386 8500 8685 8890 8989 9161 98 1.94 9494 9660 9827 9995 5162 5830 6498 5666 5885 10 1.95 9.991178 1348 1513 1683 1858 2024 2195 2386 2537 27 1.96 2981 3064 3227 3399 3573 3746 3320 4094 4269 44							7029				6062 7680
1.94 9494 9660 9827 9995 6162 6830 6498 6666 6835 10 1.95 9.991178 1848 1512 1683 1858 2024 2195 2986 2537 27 1.96 2881 3064 3227 3399 3573 3746 3920 4094 4269 44	1.93		8007	8171	8886	8500	8665	8830	8996	9161	9327
1.96 2881 3054 3227 8399 3573 3746 3920 4094 4269 44	1.94	9494	9660	9827	9995	6162	6 8 30	6 198	6666	6835	1004
											2709 4443
	1.96	2581 4618	4794	4969	5145	5821	5498	5674	5851	6029	6206
1.98 6884 6562 6740 6919 7078 7277 7457 7687 7817 79	1.98	6884	6562	6740	6919	7078	7277	7457	7637	7817	7997
1.99 8178 8359 8540 8722 8908 9085 9268 9450 9633 98	1.99	8178	8359	8540	8722	8908	9085	9268	9450	9633	9816

VI.—TABLE OF REDUCTION FROM COMMON TO METRIC SYSTEM.

	Inches to Millimeters.								
	1	2	8	4	5	6	7	8	9
	25.40	50.80	76.20		127.00	152.40			
10	279.40	804.80	330.19		880.99	406.89			482.5
20 30	533.89	558.79	584.19		634.99	660.89			736.5
40	787.39	812.79	838 19	863.59	888.99	914.39			
40	1041.4	1066.8	1092.2	1117.6	1143.0	1168.4	1193.8	1219.2	1244.6
50	1295.4	1320.8	1346.2	1371.6	1397.0	1422.4	1447.8	1473.2	1498.6
60	1549.4	1574.8	1600.2	1625.6	1651.0	1676.4	1701.8	1727.2	1752.6
70	1803.4	1828.8	1854.2	1879.6	1905.0	1930.4	1955.8	1981.2	2006.6
80 l	2057.4	2082.8	2108.2	2133.6	2159.0	2184.4	2209.8	2235.2	2260.6
90	2311.4	2336.8	2362.2	2387.6	2413.0	2438.4	2463.8	2489.2	2514.6
	Twel	fths.		Sixteenths.					
/12	2.12	7/12 1	4.82 1/	16 1.59	5/16	7.94	9/16 14	.29 13/	16 20.6
/12	4.28	8/12 1	8.93 1/	8 3.17	8/8	9.52	5/8 15	.87 7/1	3 22.2
/12	6.35	9/12 1	9.05 3/					.46 15/	16 23.8
/12	8.47		1.17 1/	4 6.35	1/2	12.70	8/4 19	.05 1	25.4
/12	10.58		3.28	- 1				il	1
/12	12.70	12/12 2	5.40	- 1	11 1	11	- 1	II	1
	<u> </u>		11		11	11			

FIRST TO SIXTH POWERS OF INTEGERS. 59

TABLE VII.-FIRST TO SIXTH POWERS OF INTEGERS FROM 1 TO 80.

		P	owers.		
First.	Second.	Third.	Fourth.	Fifth.	Sixth.
1	1	1	1	1	1
2	4	8	16	32	64
8	9	27	81	248	729
4	16	64	256	1024	4096
5	25	125	625	8125	15625
6	36	216	1296	7776	46656
7	49	343	2401	16807	117649
8	64	512	4096	82768	262144
9	81	729	6561	59049	531441
10	100	1000	10000	100000	1000000
11	121	1331	14641	161051	1771561
19	144	1728	20786	248882	2985984
18	169	2197	28561	371293	4826809
14	196	2744	39416	587824	7529586
15	225	8375	50625	759375	11890625
16	256	4096	65536	1048576	16777216
17	289	4918	83521	1419857	24137569
18	324	5832	104976	1889568	34012224
19	861	6859	130321	2476099	47045881
20	400	8000	160000	8200000	64000000
21	441	9261	194481	4084101	85766121
22	484	10648	284256	5153632	113379904
23	529	12167	279841	6436343	148035889
24	576	13824	381776	7962624	191102976
25	625	15625	390625	9765625	244140625
96	676	17576	456976	11881376	808915776
97	729	19683	581441	14348907	387420489
98	784	21952	614656	17210368	481890804
99	841	24389	707281	20511149	594823321
50	900	27000	810000	24300000	729000000

TABLE VIII.—SQUARES, CUBES, SQUARE ROOTS.

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
1 2 3 4 5 6 7 8 9	1 4 9 16 25 86 49 64 81	1 8 27 64 125 216 343 512 729	1.000000 1.4142136 1.7320508 2.0000000 2.2360680 2.4494897 2.6457518 2.8284271 3.0000000	1.0000000 1.2599210 1.4422496 1.5874011 1.7099759 1.8171206 1.9123812 2.0000000 2.0800687	1.000000000 .50000000 .33333333 .25000000 .20000000 .166666667 .142857143 .125000000
10 11 12 13 14 15 16 17 18	100 121 144 169 196 225 256 289 824 361	1000 1331 1738 2197 2744 3375 4096 4913 5832 6859	3.1622777 3.3166248 3.4641016 3.6055513 3.7416574 3.8729833 4.0000000 4.1231056 4.2426407 4.3588989	2.1544347 2.2239601 2.2394296 2.3518347 2.4101422 2.4662121 2.5712816 2.6207414 2.66844016	.10000000 .090909091 .083333333 .076923077 .071428571 .066666667 .06250000 .058823239 .055855556
20	400	8000	4.4721360	2.7144177	.05000000
21	441	9261	4.5825757	2.7589243	.047619048
22	484	10648	4.6904158	2.8020393	.045454545
28	529	12167 /	4.7958315	2.8438670	.043478361
24	576	13824	4.8989795	2.8844991	.04166667
25	625	15625	5.000000	2.9240177	.04000000
26	676	17576	5.0990195	2.9624960	.086461538
27	729	19683	5.1961524	3.0000000	.087037087
28	784	21952	5.2915026	3.0365889	.085714286
29	841	24389	5.3851648	3.0723168	.084482759
30 31 32 33 34 35 36 37 38	900 961 1024 1069 1156 1225 1296 1369 1444 1521	27000 29791 32768 35937 38904 42875 46656 50653 54872 58319	5.4772256 5.5677644 5.6568542 5.7445626 5.8309519 5.9160798 6.0000000 6.0827625 6.1644140 6.2449980	8.1072325 8.1413806 8.1748021 8.2075243 8.2396118 8.2710668 8.3019272 8.3322218 8.3619754 8.3912114	.03333333 .032258065 .031250000 .030908080 .029411765 .028571429 .02777778 .027027027 .026315789 .025641026
40	1600	64000	6.3245553	8.4199519 8.4482172 8.4760266 8.5083981 8.5508483 8.556883 8.556883 8.5580479 8.6088261 8.6342411 8.6342411	.02500000
41	1681	68921	6.4081242		.024390244
42	1764	74068	6.4807407		.023809624
43	1849	79507	6.5574385		.023255814
44	1936	85184	6.6332496		.022727773
45	2025	91125	6.7082039		.02222222
46	2116	97336	6.7823300		.021739130
47	2209	103823	6.8556546		.021276600
48	2304	110592	6.9282082		.020638333
49	2401	117649	7.0000000		.020406163
50	2500	125000	7.0710678 7.1414284 7.2111026 7.2801099 7.3484692 7.4161985 7.4838148 7.5498344 7.6157731 7.6811457	3.6840814	.02000000
51	2601	132651		3.7084398	.019607848
52	2704	140608		3.7325111	.019230769
53	2809	148877		3.7562858	.018867925
54	2916	157464		3.7797631	.018518519
55	8025	166375		3.8029525	.015181818
56	8136	175616		3.8258624	.017357148
57	3249	185193		3.8485011	.017543960
58	3364	195112		3.8708766	.017241879
59	3481	206379		3.8929965	.016949158
60	3600	216000	7.7459667	8.9148676	.01666667
61	3721	226981	7.8102497	8.9364978	.016393443
62	3844	238328	7.8740079	8.9578915	.016129032

No.	Squares.	Cubes.	Square Roots,	Cube Roots.	Reciprocals.
63	3969	250047	7.9372539	0.0000001	011070010
64	4096	262144	8.0000000	3.9790571 4.0000000	.015878016
65	4225	274625	8.0622577	4.0207256	.015025000
66	4356	287496	8.1240384	4.0412401	.015151515
67	4489	300763	8.1853528	4.0615480	.014925373
68	4624	814432	8.2462113	4.0816551	.014705882
69	4761	828509	8.3066239	4.1015661	.014492754
70	4900	843000	8.3666003	4.1212853	.014285714
71 72	5041 5184	357911 373248	8.4261498 8.4852814	4.1408178	.014084507
78	5329	389017	8.5440037	4.1601676 4.1793390	.013888889 013698630
74	5476	405224	8.6023253	4.1983364	.013513514
75	5625	421875	8.6602540	4.2171633	.013338333
76	5776	438976	8.7177979	4.2358236	.013157895
77 78	5929	456583	8.7749644	4.2543210	.012987013
78	6084	474552	8.8317609	4.2726586	.012820513
. 79	6241	493039	8.8881944	4.2908404	.012658228
80	6400	512000	8.9442719	4.3088695	.012500000
81 82	6561	531441	9.0000000	4.3267487	.012345679
83	6724 6889	551368 571787	9.0553851 9.1104336	4.3444815	.012195122
84	7056	592704	9.1651514	4.3620707	.612048193
85	7225	614125	9.2195445	4.3795191 4.3968296	.0119047 62 .01176470 6
86	7396	636056	9.2736185	4.4140049	.011627907
96 87	7569	658503	9.3273791	4.4310476	.011494253
88	7744	681472	9.3808315	4.4479602	.011363636
89	7921	704969	9.4339811	4.4647451	.011235955
90	8100	729000	9.4868330	4.4814047	.011111111
91	8281	753571	9.5393920	4.4979414	.010989011
92 93	8464 8649	778688 804357	9.5916630 9.6436508	4.5143574	.010869565
94	8836	830584	9.6953597	4.5306549 4.5468359	.010752688 .010638298
95	9025	857375	9.7467943	4.5629026	.010526316
96	9216	884786	9.7979590	4.5788570	.010416667
97	9409	912673	9.8488578	4.5947009	.010309278
98	9604	941192	9.8994949	4.6104363	.010204082
99	9801	970299	9.9498744	4.6260650	.010101010
100	10000	1000000	10.0000000	4.6415888	.010000000
101	10201	1030301	10.0498756	4.6570095	.009900990
102 108	10404	1061208 1092727	10.0995049 10.1488916	4.6723287	.009803922
104	10816	1124864	10.1488916	4.6875482 4.7026694	.009708738 .009615385
105	11025	1157625	10.1960590	4.7176940	.009523810
106	11236	1191016	10.2956301	4.7326235	.009433962
107	11449	1225043	10.3440804	4.7474594	.009345794
108	11664	1259712	10.3923048	4.7622032	.00.259259
109	11881	1295029	10.4403065	4.7768562	.009174312
110 111	12100 12321	1331000 1367631	10.4880885 10.5356538	4.7914199 4.8058955	.009090909
112	12544	1404928	10.5830052	4.8202845	.009009009
118	12769	1442897	10.6301458	4.8345881	.008849558
114	12996	1481544	10.6770783	4.8488076	.008771930
115	13225	1520875	10.7238053	4.8629442	.008695652
116	13456	156089 6	10.7703296	4.8769990	.008620690
117	13689	1601613	10.8166538	4.8909782	.008547009
118 119	13924 14161	1643032 1685159	10.8627805 10.9087121	4.9048681 4.9186847	.008474576
120	14400	1728000	10.9544512	4.9324242	.008333333
121	14641	1771561	11.0000000	4.9460874	.008264463
122	14884	1815848	11.0453610	4.9596757	.008196721
123	15129	1860867	11.0905365	4.9731898	.008130081
124	15376	19066:24	11.1355287	4.9866310	.008064516

TABLE VIII.—SQUARES, CUBES, SQUARE ROOTS.

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals
125	15625	1953125	11.1803399	5,0000000	.008000000
126	15876	2000876	11.2249722	5.0132979	.007936508
127	16129	2048388	11.2694277	5.0265257	.007874016
128	16384	2097152	11.3137085	5.0396842	.007812500
129	16641	2146689	11.3578167	5.0527743	.007751938
130	16900	2197000	11.4017543	5.0657970	.007692308
131	17161	2248091	11.4455231	5.0787581	.007633588
132	17424	2299968 2352637	11.4891253 11.5325626	5.0916434 5.1044687	.007575758
138 134	17689 17956	2406104	11.5758369	5.1172299	.007462687
135	18225	2460375	11.6189500	5.1299278	.007407407
136	18496	2515456	11.6619038	5.1425632	.007352941
137	18769	2571353	11.7046999	5.1551367	.007299270
138	19044	2628072	11.7473401	5.1676493	.007246377
139	19321	2685619	11.7898261	5.1801015	.007194245
140	19600	2744000	11.8321596	5.1924941	.007142857
141	19881	2803221	11.8743421	5.2048279	.007092199
142	20164	2863288	11.9163753	5.2171034	.007042254
148	20449	2924207	11.9582607	5.2293215	.006993007
144	20736	2985984	12.0000000	5.2414828	.006944444
145	21025	8048625	12.0415946	5.2535879	.006896552
146	21316	8112136 8176528	12.0830460 12.1243557	5.2656374 5.2776321	.006849315
147 148	21609 21904	3241792	12.1655251	5.2895725	.006756757
149	22201	8307949	12.2065556	5.3014592	.006711409
150	22500	8375000	12.2474487	5.3132928	.00666667
151	22801	3442951	12.2882057	5.3250740	.006622517
152	23104	3511808	12.3288280	5.3368038	.006578947
158	23409	8581577	12.3693169	5.3484812	.006535948
154	23716	3652264	12.4096736	5.3601084	.006493506
155	24025	3723875	12.4498996	5.3716854	.006451618
156	24336 24649	8796416 3869893	12.4899960 12.5299641	5.3832126 5.3946907	.006410256
157 158	24964	3944312	12.5698051	5.4061202	.006329114
159	25281	4019679	12.6095202	5.4175015	.006289308
160	25600	4096000	12.6491106	5.4288852	.006250000
161	25921	4173281	12.6885775	5.4401218	.006211180
162	26244	4251528	12.7279221	5.4518618	.006172840
163	26569	4330747	12.7671453	5.4625556	.006134969
164	26896	4410944	12.8062485	5.4737037	.006097561
165	27225	4492125	12.8452326	5.4848066	.006060606
166 167	27556 27889	457429 6 4657463	12.8840987 12.9228480	5.4958647 5.5068784	.006024096
168	28224	474163 2	12.9614814	5.5178484	.005952381
169	28561	4826809	13.0000000	5.5287748	.005917160
170	28900	4913000	18.0394048	5.5396588	.005882353
171	29241	5000211	13.0766968	5.5504991	.005847953
172	29584	5088448	13.1148770	5.5612978	.005813953
173	29929	5177717	18.1529464	5.5720546	.005780347
174	30276	5268024	18.1909060	5.5827702	.005747126
175	30625 30976	5859875	13.2287566 13.2664992	5.5934447	.005714286
176 177	31329	5451776 5545233	13.3041347	5.6040787 5.6146724	.005649718
178	31684	5639752	18.3416641	5.6252263	.005617978
179	82041	5735339	13.3790882	5.6357408	.005586592
180	32400	5832000	13.4164079	5.6462162	.00555556
181	32761	5929741	13.4536240	5.6566528	.005524862
182	83124	6028568	13.4907376	5.6670511	.005494505
183	83489	6128487	13.5277493	5.6774114	.005464481
184	33856 34225	6229504	13.5646600	5.6877340	.005434783
185 186	34596	63 316 25 64 34 856	13.6014705 13.6381817	5.6980192 5.7082675	.005405405

No.	Squares.	Cubes.	Square Roots,	Cube Roots.	Reciprocals.
187 188 189	34969 85344 85721	6589203 6644672 6751269	13.6747943 13.7118092 13.7477271	5.7184791 5.7286543 5.7387936	.005347594 .005319149 .005291005
190 191	36100 36481	6859000 6967871	13.7840488 13.8202750	5.7488971 5.7589652	.005263158
192	36864	7077888	13.8564065	5.7689982	.005208888
198 194	87249 37636	7189057 7301384	13.8924440 13.9288883	5.7789966 5.7889604	.005181347
195	38025	7414875	13.9642400	5.7988900	.005154639 .005128205
196 197	88416 88809	7529536 7645873	14.0000000 14.0856688	5.8087857 5.8186479	.005102041
198	89204	7045575 7762392	14.0712473	5.8284767	.005076142
199	89601	7880599	14.1067860	5.8382725	.005025126
200 • 201	40000 40401	8000000 8120601	14.1421356 14.1774469	5.8480855 5.8577660	.005000000
202	40804	8242408	14.2126704	5.8674643	.004950495
208 204	41209 41616	8365427 8489664	14.2478068 14.2828569	5.8771307 5.8867653	.004926108
205	42025	8615125	14.3178211	5.8963685	.004878049
206 207	42436 42849	8741816 8869743	14.8527001	5.9059406	.004854369
208	43264	8998912	14.3874946 14.4222051	5.9154817 5.9249921	.004807692
209	43681	9129829	14.4568828	5.9844721	.004784689
210 211	44100 44521	9261000 9898931	14.4913767 14.5258390	5.9489220 5.9583418	.004761905
212	44944	9528128	14.5602198	5.9627320	.004716981
213 214	45369 45796	9663597 9800344	14.5945195 14.6287388	5.9720926 5.9814240	.004694886
215	46225	9988875	14.6628783	5.9907264	.004651168
216 217	46656 47089	10077696 10218313	14.6969385 14.7309199	6.0000000 6.0092450	.004629630
218	47524	10860232	14.7648281	6.0184617	.004587156
219	47961	10508459	14.7986486	6.0276502	.004566210
220 221	48400 48841	10648000 10793861	14.8323970 14.8660687	6.0368107 6.0459485	.004545455
222	49284	10941048	14.8996644	6.0550489	.004504505
228 224	49729 50176	11089567 11239424	14.9881845 14.9666295	6.0641270 6.0731779	.004484306
225	50625	11390625	15.0000000	6.0822020	.004444444
226 227	51076 51529	11548176 11697088	15.0832964 15.0665192	6.0911994 6.1001702	.004424779
228	51984	11852852	15.0996689	6.1091147	.004385965
229	52441	12008989	15.1327460	6.1180332	.004366812
230 231	52900 53361	12167000 12326391	15.1657509 15.1966842	6.1269257 6.1357924	.004347826
232	53824	12487168	15.2315462	6.1446837	.004810345
283 234	54289 54756	12649337 12812904	15.2648375 15.2970585	6 1534495 6 1622401	.004291845
235	55225	12977875	15.3297097	6.1710058	.004255319
236 237	55696 56169	13144256 13312053	15.3622915 15.8948048	6.1797466 6.1884628	.004237288
238	56644	13481272	15.4272486	6.1971544	.004201681
239	57121	13651919	15.4596248	6.2058218	.004184100
240 241	57600 58081	13824000 13997521	15.4919884 15.5241747	6.2144650 6.2230843	.004166667
242	58564	14172488	15.5568492	6.2316797	.004132281
243 244	59049 59536	14348907 14526784	15.5884573 15.6204994	6.2402515 6.2487998	.004115226
245	60025	14706125	15.6524758	6.2573248	.004081638
246 247	60516 61009	14886936 15069228	15.6843871 15.7162836	6.2658266 6.2743054	.004065041
248	61504	15252992	15.7480157	6.2827613	,004082258

TABLE VIII.—SQUARES, CUBES, SQUARE ROOTS.

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals
249	62001	15438249	15.7797338	6.2911946	.004016064
250	62500	15625000	15.8113883	6.2996058	.004000000
251	63001	15813251	15.8429795	6.3079935	.008984064
252	63504	16003008	15.8745079	6.8163596	.003968254
253	64009	16194277 16387064	15.9059737 15.9373773	6.8247035 6.3330256	.003952569
254 255	64516 65025	16581375	15.9687194	6.3413257	.003921569
256	65536	16777216	16.0000000	6.8496042	.003906250
257	66049	16974593	16.0312195	6.3578611	.003891051
258	66561	17173512	16.0623784	6.8660968	.003875969
259	67081	17373979	16.0934769	6.3743111	.003861004
260	67600	17576000	16.1245155	6.3825048	.003846154
261 263	68121 68644	17779581 17984728	16.1554944 16.1864141	6.8906765 6.8988279	.003831418
263 263	69169	18191447	16.2172747	6.4069585	.003802281
264	69696	18399744	16.2480768	6.4150687	.003787879
265	70225	18609625	16.2788206	6.4231583	.003778585
266	70756	18821096	16.3095064	6.4312276	.003759898
267	71289	19034163	16.3401346	6.4392767	.003745818
268	71824	19248832	16.3707055	6.4473057	.008731843
269	72361	19465109	16.4012195	6.4553148	.008717472
270 271	72900	19683000 19902511	16.4316767 16.4620776	6.4633041 6.4712786	.008708704
272	73441 73984	20123648	16.4924225	6.4792236	.003676471
273	7452)	20346417	16.5227116	6.4871541	.003663004
274	75076	20570824	16.5529454	6.4950653	.003649685
275	75625	20796875	16.5831240	6.5029572	.003686864
276	76176	21024576	16.6132477	6.5108300	.003623188
277	76729	21253933	16.6433170	6.5186839	.003610108
278 279	77284 77841	21484952 21717639	16.6783320 16.7082931	6.5265189 6.5343351	.008597122
280	78400	21952000	16.7332005	6.5421326	.008571429
281	78961	22188041	16.7680546	6.5499116	.008558719
282	79524	22425768	16.7928556	6.5576722	.003546099
283	80089	22665187	16.8226038	6.5654144	.008588569
284 285	80656 81225	22906304 23149125	16.8522995 16.8819430	6.5731385 6.5808443	.008521127
286	81796	23393656	18, 9115845	6.5885323	.003496508
287	82369	23639903	16.9410743	6.5962023	.008484821
288	82944	23887872	16.9705027	6.6038545	.003472222
289	83521	24137569	16.9410748 16.9705027 17.0000000	6.6114890	.008460208
290 291	84100	24389000 24642171	17.0293864 17.0587221	6.6191060 6.6267054	.003448276
291 292	84681 85264	24897088	17.0880075	6.6842874	.003430420
293	85849	25153757	17.1172428	6.6418522	.003412969
294	86436	25412184	17.1464282	6.6493998	.003401861
295	87025	25672375	17.1755640	6.6569302	.003389881
296	87616	25934336	17.2046505	6.6644437	.008378378
297	88209	26198073	17.2336879	6.6719408	.003367008
298 299	88804 89401	26463592 26730899	17.2626765 17.2916165	6.6794200 6.6868831	.003355705 .003344483
300	90000	27000000	17.3205081	6.6943295	.003333333
301	90601	27270901	17.3493516	6.7017593	.0033:22259
802	91204	27543608	17.3781472	6.7091720	.003311258
303 304	91809	27818127	17.4068952 17.4355958	6.7165700	.003300830
304 305	92416 93025	28094464 28372625	17.4642492	6.7289508 6.7313155	.003289474
806	93636	2865261 6	17.4928557	6.7886641	.003267974
807	94249	28934443	17.5214155	6.7459967	.003257329
308	94864	29218112	17.5499288	6.7588134	.003946753
809	95481	29503629	17.5788958	6.7606143	.008236246
310	96100	29791000	17.6068169	6.7678995	.003225806

No.	Squares,	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
311	96721	80090231	17.6351921	6.7751690	.003215484
812	97344	80371328	17.6635217	6.7824229	.003205128
813	97969	30664297	17.6918060	6.7896618	.003194888
814	98596	80959144	17.7200451	6.7968844	.008184713
315 316	99225 99856	81255875 81554496	17.7482398 17.7763888	6.8040921 6.8112847	.008174608
317	100489	81855013	17.8044938	6.8184620	.008154574
818	101124	32157432	17.8325545	6.8256242	.003144654
319	101761	82461759	17.8605711	6.8827714	.003134796
320	102400	82768000	17.8885438	6.8399087	.008125000
321	109041	88076161	17.9164729	6.8470213	.003115265
322	103684	83386248	17.9443584	6.8541240	.003105590
328 324	104329 104976	83698267 84012224	17.9722008 18.0000000	6.8612120 6.8682855	.003095975
325	105625	84328125	18.0277564	6.8758443	.003076928
326	106276	84645976	18.0554701	6.8823888	.003067485
327	106929	84965783	18.0831413	6.8894188	.003058104
328	107584	85287552	18.1107703	6.8964345	.003048780
829	108241	35611289	18.1383571	6.9034359	.003039514
330	108900	85937000	18.1659021	6.9104232	.003030303
331	109561	86264691	18.1934054	6.9178964	.003021148
332 333	110224 110889	36594368 36926037	18.2206672 18.2482876	6.9243556 6.9313008	.003012048
334	111556	87259704	18.2756669	6.9382321	.002994012
335	112225	37595375	18.3030052	6.9451496	.002985075
336	112896	87933056	18.3303028	6.9520533	.002976190
837	113569	88272758	18.3575598	6.9589484	.002967359
338	114244	88614472	18.3847763	6.9658198	.002958580
839	114921	88958219	18.4119526	6.9726826	.002949853
340	115600	89304000	18.4390889	6.9795821	.002941176
841	116281	89651821	18.4661858	6.9863681	.002932551
842 348	116964 117649	40001688 40353607	18.4932420 18.5202592	6.9981906 7.0000000	.002923977
344 844	118336	40707584	18.5472370	7.0067962	.002906977
845	119025	41063625	18.5741756	7 0135791	.002898551
346	119716	41421736	18.6010752	7.0203490	.002890173
847	120409	41781928	18.6279360	7.0271058	.002881844
848	121104	42144192	18.6547581	7.0338497	.002873563
349	121801	42508549	18.6815417	7.0405806	.002865330
850	122500 123201	42875000	18.7082869	7.0472987	.002857143
351 352	123201	48243551 48614208	18.7349940 18.7616630	7.0540041 7.0606967	.002849003
858	124609	43986977	18.7882942	7.0678767	.002832861
854	125816	44361864	18.8148877	7.0740440	.002824859
355	126025	44788875	18.8414437	7.0806988	.002816901
856	126736	45118016	18.8679623	7.0878411	.002808989
357	127449	45499298	18.8944436	7.0939709	.002801120
358 359	128164 128881	45882712 46268279	18.9208879 18.9472953	7.1005885 7.1071987	.002793296
. 360	129600	46656000	18.9736660	7.1071987	
. 360 361	130321	47045881	19.0000000	7.1137806	.002777778
362	181044	47437928	19.0262976	7.1269860	.002762431
863	131769	47832147	19.0525589	7.1334925	.002754821
364	132496	48228544	19.0787840	7.1400370	.002747258
365	183225	48627125	19.1049732	7.1465695	.002739726
366	138956	49027896	19.1311265	7.1530901	.002732240
867	134689	49430868	19.1572441	7.1595988	.002724796
368 369	135424 136161	49836082 50243409	19.1833261 19.2098727	7.1660957 7.1725809	.002717391
	1 - 1		-	i e	1
370 871	136900 137641	50658000 51064811	19.2353841 19.2613603	7.1790544 7.1855162	.002702708
872	138384	51478848	19.2873015	7.1919663	.002688172

TABLE VIII .- SQUARES, CUBES, SQUARE ROOTS.

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
878	139129	51895117	19.3132079	7.1984050	.002680965
874	139876	52313624	19.3390796	7.2048322	.002673797
875	140625	52734875	19.3649167	7.2112479	.002666667
876	141876 142129	58157876	19.3907194	7.2176522	.009659574
877 37 8	142884	53582638 54010152	19.4164878 19.4422221	7.2240450 7.2304268	.002652520
879	143641	54439939	19.4679228	7.2367972	.002688522
880	144400	54872000	19.4935887	7.2431565	.002681579
881	145161 145924	55806841	19.5192218	7.2495045	.002624672
882 883	146689	55742968 56181887	19.5448208 19.5708858	7.2558415 7.2621675	.002617801
884	147456	56623104	19.5959179	7.2684824	.002610966
885	148225	57066625	19.6214169	7.2747864	.002597403
386	148996	57512456	19.6468827	7.2810794	.002590674
887	149769	57960608.	19.6723156	7.2873617	.002588979
888	150544	58411072	19.6977156	7.2936330	.002577820
889	151821	58863869	19.7280829	7.2998936	.002570694
890 891	152100 152881	59319000 59776471	19.7484177 19.7787199	7.8061486 7.8128828	.002564108
892	153664	60286288	19.7989899	7.8186114	.002551020
393	154449	60696457	19.8242276	7.3248295	.002544529
894	155236	61162984	19.8494332	7.3310369	.002538071
895	156025	61629875	19.8746069	7.3872389	.002531646
896	156816	62099136	19.8997487	7.3484205	.002525253
397 398	157609	62570773	19.9248588	7.3495966	.002518892
399	158404 159201	63044792 63521199	19.9499878 19.9749844	7.8557624 7.8619178	.002512563
400	160000	64000000	20,0000000	7.8680630	.002500000
401	160801	64481201	20.0249844	7.8741979	.002498766
402	161604	64964808	20.0499377	7.3808227	.002487562
408	162409 163216	65450827	20.0748599	7.8864873	.002481890
404 405	164025	65939264 66430125	20.0997512 20.1246118	7.3925418 7.3986363	.002475248
406	164836	66923416	20.1494417	7.4047206	.002469136
407	165649	67419148	20.1742410	7.4107950	.002457002
408	166464	67917812	20.1990099	7.4168595	.002450980
409	167281	68417929	20.2287484	7.4229142	.002444988
410 411	168100 168921	68921000 69426531	20.2484567	7.4289589	.002489024
412	169744	69934528	20.2781849 20.2977881	7.4349938 7.4410189	.002483090
418	170569	70444997	20.3224014	7.4470842	.002421308
414	171396	70957944	20.3469899	7.4530399	.002415459
415	172225	71473375	20.3715488	7.4590859	.002409639
416	178056	71991296	20.3960781	7.4650228	.002408846
417	178889	72511718	20.4205779	7.4709991	.002398082
418 419	174724 175561	73034632 73560059	20.4450483 20.4694895	7.4769664 7.4829242	.002392844
420	176400	74088000	20.4939015	7.4888724	.002380952
421	177241	74618461	20.5182845	7.4948118	.002375297
422	178084	75151448	20.5426386	7.5007406	.002869668
423	178929	75686967	20.5669638	7.5066607	.002364066
424	179776	,6225024	20 5912603	7.5125715	.002358491
425 426	180625 181476	76765625	20.6155281	7.5184730	.002352941
427	182329	77308776 77854483	20.6397674 20.6639783	7.5243652 7.5302482	.002847418
428	183184	78402752	20.6881609	7.5361221	.002341920
429	184041	78953589	20.7128152	7.5419867	.002331002
430	184900	79507000	20.7364414	7.5478423	.002325581
431	185761	80062991	20.7605395	7.5536888	.002320186
432 438	186624 187489	80621568 81182737	20.7846097 20.8086520	7.5595263 7.5653548	.002314815
400	1 101409	01106101	<i>a</i> u. ouooaau	1.00000048	I ERSEBARSI

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
435	189225	82312875	20.8566536	7.5769849	.002298851
436	190096	82881856	20.8806130	7.5827865	.002293578
437	190969	83453453	20.9045450	7.5885793	.002238330
438 439	191844 192721	84027672 84604519	20.9284495 20.9528268	7.5943633 7.6001385	.002283105
440	193600	85184000	20.9761770	7.6059049	.002272727
441	194481	85766121	21.0000000	7.6116626	.002267574
442	195364	86350888	21.0237960	7.6174116	.002262443
448	196249	86938307	21.0475652	7.6231519	.002257336
444	197136	87528384	21.0713075 21.0950231	7.6288837 7.6346067	.002252252 .002247191
445 446	198025 198916	88121125 88716536	21.1187121	7.6403213	.002242152
447	199809	89314623	21.1423745	7.6460272	.002237136
448	200704	89915392	21.1660103	7.6517247	.002232143
449	201601	90518849	21.1896201	7.6574183	.002227171
450	202500	91125000	21.2132034 21.2367606	7.6630943	.002222222
451 452	203401 204304	91733851 92345408	21.2367606 21.2602916	7.6687665 7.6744303	.002217295 .002212389
453	204304	92959677	21.2837967	7.6800857	.002207506
454	206116	93576664	21.3072758	7.6857328	.002202643
455	207025	94196375	21.3307290	7.6913717	.002197802
456	207936	94818816	21.3541565	7.6970023	.002192982
457	208849	95443993	21.3775583 21.4009346	7.7026246 7.7082388	.002188184 .002183406
458 459	209764 210681	96071912 96702579	21.4242853	7.7138448	.002178649
460	211600	97336000	21.4476106	7.7194426	.002173913
461	212521	97972181	21.4709106	7.7250325	.002169197
462	213444	98611128	21.4941853	7.7306141	.002164502
463	214369	99252847	21.5174348	7.7361877	.002159827
464 465	215296 216225	99897344 100544625	21.5406592 21.5638587	7.7417532 7.7473109	.002155172 .002150538
466	217156	101194696	21.5870331	7.7528606	.002145923
467	218089	101847563	21.6101828	7.7584023	.002141328
468 469	219024	102503232 103161709	21.6333077 21.6564078	7.7639361 7.7694620	.002136752 .002132196
470	219961 220900	103101709	21.6794834	7.7749801	.002127660
471	221841	104487111	21.7025344	7.7804904	.002123142
472	222784	105154048	21.7255610	7.7859928	.002118644
478	223729	105823817	21.7485632	7.7914875	.002114165
474	224676	106496424	21.7715411	7.7969745	.002109705
475	225625	107171875	21.7944947	7.8024538 7.8079254	.002105263
476 477	226576 227529	107850176 108531333	21.8174242 21.8403297	7.8133892	.002100840
478	228484	109215352	21 8632111	7.8188456	.002092050
479	229441	109902239	21.8860686	7.8242942	.002087683
480	230400	110592000	21.9089023	7.8297353	.002088333
481	231361 232324	111284641 111980168	21.9317122 21.9544984	7.8351688 7.8405949	.002079002
482 483	233289	112678587	21.9544964	7.8460134	.002070393
484	234256	113379904	22.0000000	7.8514244	.002066116
485	235225	114084125	22.0227155	7.8568281	.002061856
486	236196	114791256	22.0454077	7.8622242	.002057613
487	237169	115501303	22.0680765	7.8676130	.002053388
488 489	238144 239121	116214272 116980169	22.0907220 22.1133444	7.8729944 7.8783684	.002049180
490	240100	117649000	22.1359436	7.8837352	.002040816
491	241081	118370771	22.1585198	7.8890946	.002036660
492	242064	119095488	22.1810730	7.8944468	.002032520
493 494	243049 244036	119823157 120553784	22.2036033 22.2261108	7.8997917 7.9051294	.002028398
495	245025	121287375	22.2485955	7.9104599	.002020202
496	246016	122023936	22.2710575	7.9157832	.002016129

TABLE VIII.—SQUARES, CUBES, SQUARE ROOTS.

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
497	247009	122763473	22.2934968	7.9210994	.002012072
498	248004	123505992	22.3159136	7.9264085	.002008082
499	249001	124251499	22.3383079	7.9317104	.002004008
-500	250000	125000000	22.3606798	7.9370053	.002000000
501	251001	125751501	22.3830293	7.9422931	.001996008
502	252004	126506008	22.4053565	7.9475789	.001992082
508	253009	127263527	22.4276615	7.9528477	.001988072
504	254016	128024064	22.4499443	7.9581144	.001984127
505	255025	128787625	22.4722051	7.9638743	.001980198
506	256036	129554216	22.4944438	7.9686271	.001976285
507	257049	130323843	22.5166605	7.9738781	.001972387
508	258064	131096512	22.5388553	7.9791122	.001968504
509	259081	131872229	22.5610283	7.9848444	.001964637
510	260100	132651000	22.5831796	7.9895697	.001960784
511	261121	133432831	22.6053091	7.9947883	.001956947
512	262144	134217728	23.6274170	8.0000000	.001953125
518	263169	135005697	22.6495033	8.0052049	.001949318
514	264196	135796744	22.6715681	8.0104032	.001945525
515	265225	136590875	22.6936114	8.0155946	.001941748
516	266256	137388096	22.7156334	8.0207794	.001987984
517	267289	188188413	22.7376340	8.0259574	.001934236
518	268324	138991832	22.7596134	8.0311287	.001930502
519	269361	139798359	22.7815715	8.0362935	.001926782
520	270400	140608000	22.8035085	8.0414515	.001929077
521	271441	141420761	22.8254244	8.0466030	.001919386
522	272484	142236648	22.8473193	8.0517479	.001915709
523	273529	143055667	22.8691933	8.0568862	.001912046
524	274576	143877824	22.8910463	8.0620180	.001908397
525	275625	144708125	22.9128785	8.0671432	.001904762
526	276676	145521576	22.9346899	8.0722620	.001901141
527	277729	146363183	22.9564806	8.0773743	.001897533
528	278784	147197952	22.9782506	8.0824800	.001893939
529	279841	148035889	23.0000000	8.0875794	.001890359
530	280900	148877000	23.0217289	8.0926723	.001886792
531	281961	149721291	23.0434372	8.0977589	.001883239
532	283024	150568768	23.0651252	8.1028390	.001879699
533 534 535 536	284089 285156 286225	151419437 152273304 153130375 153990656	23.0867928 23.1084400 23.1300670	8.1079128 8.1129803 8.1180414	.001876173 .001872659 .001869159 .001865672
537 538 539	287296 288369 289444 290521	154854153 155720872 156590819	23.1516738 23.1732605 23.1948270 23.2163735	8.1230962 8.1281447 8.1331870 8.1382230	.001862197 .001858736 .001855288
540	291600	157464000	23.2379001	8.1432529	.001851852
541	292681	158340421	23.2594067	8.1482765	.001848429
542	293764	159220088	23.2808935	8.1532989	.001845018
543	294849	160103007	23.3023604	8.1583051	.001841621
544	295986	160989184	23.3238076	8.1633102	.001838235
545	297025	161878625	23.3452351	8.1683093	.001834862
546	298116	162771336	23.3666429	8.1733020	.001831502
547	299209	163667323	23.3880311	8.1782888	.001828154
548	300304	164566592	23.4093998	8.1832695	.001824818
549	301401	165469149	23.4307490	8.1882441	.001821494
550	302500	166375000	23.4520788	8.1932127	.001818182
551	303601	167284151	23.4733892	8.1981752	.001814882
552	304704	168196608	23.4946802	8.2031319	.001811594
553	305809	169112377	23.5159520	8.2080825	.001808318
554	306916	170031464	23.5372046	8.2130271	.001805054
555	308025	170953875	23.5584380	8.2179657	.001801808
556	309136	171879616	23.5796522	8.2228985	.001798561
557	310249	172808693	23.6008474	8.2278254	.001795882
558	811364	173741112	23.6220236	8.2327463	.001792115

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals
559	812481	174676879	28.6481808	8.2376614	001786909
560	313600	175616000	23.6643191	1 .	1
561	314721	176558481	23.6854886	8.2425706 8.2474740	.001785714
562	315844	177504828	23.7065892	8.2523715	.001782531 001779359
563	316969	178453547	23.7276210	8.2572638	001776199
564	318096	179406144	23.7486842	8.2621492	.001778050
565	319225	180862125	23.7697286	8.2670294	.001769912
566 567	320356 321489	181821496 182284263	23.7907545 23.8117618	8.2719089	.001766784
568	822624	183250432	23.8327506	8.2767726 8.2816355	.001768668
569	323761	184220000	25.8537209	8.2864928	.001757469
570	324900	185193000	23.8746728	8.2918444	.001754386
571	826041	186169411	23.8956063	8.2961903	.001751818
572	327184	187149248	23.9165215	8.3010304	.001748252
578 574	328329 329476	188132517 189119224	23.9374184 23.9582971	8.3058651 8.3106941	.001745201
575	880625	190109375	23.9791576	8.3155175	.001739180
576	331776	191102976	24.0000000	8.3203353	.001736111
577	332929	192100033	24.0208243	8.3251475	.001783102
578	834084	198100552	24.0416306	8.3299542	.001730104
579	835241	194104539	24.0624188	8.3347558	.601727116
580	836400	195112000	24.0831891	8.3395509	.001724138
581	337561	196122941	24.1039416	8.3443410	.001721170
582 583	338724 339889	197137368 198155287	24.1246762 24.1453929	8.3491256 8.3539047	.001718218
584	341056	199176704	24.1660919	8.3586784	.001712829
585	342225	200201625	24.1867732	8.3634466	.001709402
586	343396	201230056	24.2074369	8.3682095	001706485
587	344569	202262003	24.2280829	8.8729668	.001703578
588 589	345744 346921	203297472 204336469	24.2487113 24.2693222	8.3777188 8.3824653	.001700680
590	348100	205379000	24.2899156	8.3872065	.001694915
591	349281	206425071	24.3104916	8.3919423	.001692047
592	350464	207474688	24.3310501	8.3966729	.001689189
593 594	851649 852836	208527857 209584584	24.3515913 24.3721152	8.4013981 8.4061180	.001686341
595	354025	210644875	24.3926218	8.4108326	.001683502 001680672
596	355216	211708736	24.4181112	8.4155419	.001677852
597	356409	212776173	24.4335834	8.4202460	.001675042
598	857604	213847192	24.4540385	8.4249448	.001672241
599 600	358801 360000	214921799 216000000	24.4744765 24.4948974	8.4296383 8.434 8267	.001669449
601	361201	217081801	24.5153013	8.4390098	.001666667
602	362404	218167203	24.5356883	8.4486877	.001661130
603	363609	219256227	24.5560583	8.4483605	.001658375
604	364816	220348864	24.5764115	8.4530281	.001655629
605	366025	221445125 222545016	24.5967478	8.4576906	.001652893
606 607	367236 368449	223648543	24.6170678 24.6378700	8.4623479 8.4670001	.001650165
608	369664	224755712	24.6576560	8.4716471	.001644787
609	370881	225866529	24.6779254	8.4762892	.001642036
610	372100 373321	226981000	24.6981781	8.4809261	.001639344
611 612	374544	228099131 229220928	24.7184142 24.7386338	8.4855579 8.4901848	.001636661 001633987
618	375769	230346397	24.7588368	8.4948065	001631821
614	876996	231475544	24.7790234	8.4994238	.001628664
615	378225	232608375	24.7991935	8.5040350	.001626016
616	379456 380689	233744896	24.8198478	8.5086417	.001628877
617 618	381924	234885113 236029032	24.8394847 24.8596058	8.5182435 8.5178408	.001620746
619	883161	237176659	24.8797106	8.5224821	.001615509
620	884400	238328000	24.8997992	8.5270189	.001612908

TABLE VIII.—SQUARES, CUBES, SQUARE ROOTS.

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals
621	385641	239483061	24.9198716	8.5816009	.001610806
622	386884	240641848	24.9399278	8.5361780	.001607717
623	388129	241804867	24.9599679	8.5407501	.001605136 .001602564
624	389376	242970624	24.9799920	8.5458173 8.5498797	.001602364
625	390625	244140625	25.0000000	8.5544372	.001597444
626	391876	245314376	25.0199920 25.0399681	8.5589899	.001594896
627	893129	246491883 247673152	25.0599282	8.5635377	.001592357
628 629	894384 895641	248858189	25.0798724	8.5680807	.001589825
630	396900	250047000	25,0998008	8.5726189	.001587302
631	398161	251239591	25.1197134	8.5771523	.001584786
632	399424	252435968	25.1396102	8.5816809	.001582278
633	400689	253636137	25.1594913	8.5862047	.00157 977 9 .00157 728 7
634	401956	254840104	25.1793566	8.5907238 8.5952380	.001574803
635	403225	256047875	25.1992063 25.2190404	8.5997476	.001572327
636	404496	257259456 258474853	25,2388589	8.6042525	.001569859
637	405769	259694072	25.2586619	8.6087526	.001567898
638 639	407044 408321	260917119	25.2784493	8.6132480	.001564945
640	409600	262144000	25.2982213	8.6177888	.001562500
641	410881	263374721	25.3179778	8.6222248	.001560062
642	412164	264609288	25.3377189	8.6267063	.001557632
643	413449	265847707	25.3574447	8.6811830	.00155210
644	414736	267089984	25.3771551	8.6356551 8.6401226	.001550888
645	416025	268336125	25.3968502 25.4165301	8.6445855	.001547988
646	417316	269586136	25,4361947	8.6490437	.001545595
647	418609	270840023 272097792	25,4558441	8.6534974	.001548210
648 649	419904 421201	278359449	25.4754784	8.6579465	.001540832
650	422500	274625000	25.4950976	8.6623911	.001538462
651	423801	275894451	25.5147016	8.6668310	.001536098
652	425104	277167808	25.5342907	8.6712665	.001583742
653	426409	278445077	25.5538647	8.6756974	.001531394 .001529052
654	427716	279726264	25.5734237	8.6801237 8.6845456	.001526718
655	429025	281011375	25.5929678 25.6124969	8.6889630	.001524890
656	430336	282800416 283593393	25.6320112	8.6933759	.001522070
657 658	431649 432964	284890812	25.6515107	8.6977843	.001519757
659	434281	286191179	25.6709953	8.7021882	.001517451
660	435600	287496000	25.6904652	8.7065877	.001515152
661	436921	288804781	25.7099203	8.7109827	.001512859
662	438244	290117528	25.7293607	8.7153734	.001510574
663	439569	291434247	25.7487864	8.7197596	.001508296 .001506024
664	440896	292754944	25.7681975	8.7241414 8.7285187	.001508759
665	442225	294079625 295408296	25 .7875939 25 .8069758	8.7328918	.001501502
666	443556	295408296 296740963	25.8263431	8.7372604	.001499250
667 668	444889 446224	298077632	25.8456960	8.7416246	.001497006
669	447561	299418309	25.8650343	8.7459846	.001494768
670	448900	300763000	25.8843582	8.7503401	.001492587
671	450211	302111711	25.9036677	8.7546913	.001490818
672	451584	303464448	25.9229628	8.7590383	.001488095
673	452929	304821217	25.9422435	8.7633809 8.7677192	.001483680
674	454276	306182024	25.9615100	8.7720532	.001483481
675	455625	307546875 308915776	25.9807621 26.0000000	8.7763830	.001479290
676	456976 458329	310288733	26.0192237	8.7807084	.001477105
677 678	459684	811665752	26.0384331	8.7850296	.001474926
679	461041	313046839	6.0576284	8.7893466	.001472754
680	462400	814432000	26.0768096	8.7936593	.001470588
681	463761	815821241	26.0959767	8.7979679	.001468429 .001466276
682	465124	817214568	26.1151297	8.8022721	1 .001400810

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
683	466489	818611987	26.1342687	8.8065722	.001464129
684	467856	820013504	26.1533937	8.8108681	.001461988
685	469225	821419125	26.1725047	8.8151598	.001459854
686	470596	322828856	26.1916017	8.8194474	.001457726 .001455604
687	471969	324242703 325660672	26.2106848 26.2297541	8.8237307 8.8280099	.001453488
688 689	473344 474721	327082769 .	26.2488095	8.8322850	.001451379
690	476100	328509000	26.2678511	8.8365559	.001449275
691	477481	829939371	26.2868789	8.8408227	.001447178
692	478864	831373888	26.3058929	8.8450854	.001445087 .001443001
693	480249	332812557 334255384	26.3248932 26.3438797	8.8493440 8.8535985	.001440922
694 695	481636 483025	335702375	26.3628527	8.8578489	.001438849
696	484416	837153536	26.3818119	8.8620952	.001436782
697	485809	338608873	26,4007576	8.8663375	001434720
698	487204	340068392	26.4196896	8.8705757	001432665
699	488601	341532099	26.4386081	8.8748099	.001430615
700	490000	343000000	26.4575131	8.8790400 8.8832661	.001428571 .001426584
701	491401 492804	344472101 345948408	26.4764046 26.4952826	8.8874882	001424501
702 703	494209	347428927	26.5141472	8.8917063	001422475
704	495616	348913664	26.5329983	8.8959204	.001420455
705	497025	350402625	26.5518361	8.9001304	.001418440
706	498436	851895816	26.5706605	8.9043366	.001416431
707	499849	853393243	26.5894716	8.9085387	.001414427
708	501264	354894912 356400829	26.6082694 26.6270539	8.9127369 8.9169311	.001412429
709	502681				•
710	504100	357911000 359425431	26.6458252 26.6645838	8.9211214 8.9253078	001408451 001406470
711 712	505521 506944	360944128	26.6833281	8.9294902	.001404494
713	508369	362467097	26.7020598	8.9336687	.001402525
7:4	509798	863994344	26.7207784	8.9378433	.001400560
715	511225	365525875	26.7394839	8.9420140	.001398601
716	512656	367061696	26.7581763	8.9461809	.001396648
717	514089	368601813	26.7768557	8.9503438	.001394700
718 719	515524 516961	370146232 371694959	26.7955220 26.8141754	8.9545029 8.9586581	.001392758
720	518400	373248000	26.8328157	8.9628095	.001388889
721	519841	374805361	26.8514432	8.9669570	001386963
722	521284	876367048	26.8700577	8.9711007	.001385042
728	522729	377933067	26.8886593	8.9752406	.001383126
724	524176	879503424	26.9072481	8.9793766	.001381215
725	525625	881078125	26.9258240	8.9835089	.001379310
726	527076	382657176 384240583	26.9443872 26.9629375	8.9876373 8.9917620	.001377410 .001375516
727 728	528529 529984	385828352	26.9814751	8.9958829	001373626
729	531441	387420489	27.0000000	9.0000000	.001371742
730	532900	889017000	27.0185122	9.0041134	.001369863
731	534361	390617891	27.0370117	9.0082229	.001367989
732	535824	392223168	27.0554985	9.0128288	.001366120
733	537289	395832837	27.0739727	9.0164309 9.0205293	.001364256
784 785	538756 540225	895446904 897065375	27.0924344 27.1108834	9.0246239	.001360544
786	541696	898688256	27.1293199	9.0287149	.001358696
737	543169	400815553	27.1477439	9.0328021	.001356852
738	544644	401947272	27.1661554	9.0368857	.001355014
789	546121	403583419	27.1845544	9.0409655	.001353180
740	547600	405224000	27.2029410	9.0450419	.001351351
741	549081	406869021	27.2213152	9.0491142	.001349528
742 743	550564 552049	408518488	27.2396769 27.2580263	9.0531831 9.0572482	.001347709 .001345895
745	1 DOWNER	410172407	27.2763634	9.0613098	.001844086

TABLE VIII.—SQUARES, CUBES, SQUARE ROOTS.

No. Squares Cubes Square Roots Cube Roots Reciprocals		1 1			ı	1
746 556516 415160936 27.319007 9.0734728 0.01384683 747 558009 416889723 27.3819007 9.0734728 0.01384683 748 559504 418508992 27.3826897 9.0775197 0.01386898 749 551001 420189749 27.387584 9.0775197 0.01386898 755 550504 42555008 27.4226184 9.0866719 0.013838133 755 557009 42654751 27.4045752 9.086692 0.01383833 755 557009 426557777 27.4404575 9.0877010 0.01328281 755 557025 430568975 27.4226184 9.086719 0.01328281 755 557025 430568975 27.4226184 9.086719 0.01328281 755 57025 430568975 27.4404575 9.0877010 0.01328281 755 57025 430568975 27.440455 9.0877010 0.01328281 755 57025 430568975 27.4404545 9.0877010 0.01328281 755 57025 430568975 27.545645 9.0877010 0.01328281 755 57025 430568975 27.545645 9.087699 0.01328276 757 573049 435796936 27.5153030 9.113768 0.01324004 43551512 27.5315030 9.1137618 0.01321004 755 57025 43056875 27.515680 9.9113768 0.01321004 755 57025 43056875 27.5459646 9.1212000 0.01317838 759 576081 437845479 27.5459646 9.121200 0.01317838 759 576081 437845479 27.5459646 9.121200 0.01317838 759 576081 437845479 27.5459646 9.121200 0.01317838 759 576081 447911081 27.5852824 9.1238061 0.003117838 758 582169 444194947 27.5854549 9.1238061 0.00311690 765 583256 447957125 27.5656384 9.1377971 0.00310616 766 583666 4459455006 27.575705 9.1467576 0.00310616 766 583675 449455006 27.575705 9.1467576 0.01319386 769 591361 454756600 27.7386492 9.1618892 0.01380383 769 591361 454756600 27.7386492 9.1618892 0.01380383 769 591361 454756600 27.7388492 9.1618892 0.01380383 769 591361 454756600 27.7388492 9.1618892 0.01380383 769 591361 454756600 27.7388492 9.1618892 0.01380383 769 591361 454756600 27.7388492 9.1618892 0.01380383 769 591361 454756600 27.7388492 9.1618892 0.01380383 769 591361 454756600 27.7388492 9.1618892 0.01380383 769 591361 454756600 27.7388890 9.1385655 0.0038771 777 584441 458314011 27.7688968 9.168892 0.01380383 769 591361 454756600 27.7388969 9.1688655 0.0038771 777 584441 458314011 27.7688968 9.168892 0.01380383 777 585 591361 454756600 27.7388969 9.1688655 0.0038771 777 5864849 4800	No.	Squares.	Cubes,		Cube Roots.	Reciprocals.
746 556516 415160986 27. 3190007 9. 0784728 0.01384988 747 558009 416882723 27. 3190007 9. 0734728 0.01386988 748 559504 41850992 27. 387844 9. 0816681 0.01385988 755 556504 41850992 27. 387844 9. 0816681 0.01385988 755 556504 425255008 27. 42651872 9. 0886719 0.01385888 755 557009 42654751 27. 4408455 9. 0877010 0.01385183 755 557009 426557777 27. 4408455 9. 0877010 0.01382877 754 558516 428265104 27. 4408455 9. 0877010 0.01382821 755 557025 430869875 27. 4408455 9. 0877010 0.01382821 755 57025 430869875 27. 4408455 9. 1077069 0.01382821 755 57025 430869875 27. 4408455 9. 1077069 0.01382821 755 57025 430869875 27. 4408455 9. 1077069 0.01382821 755 57025 430869875 27. 4408455 9. 1077069 0.0138281 756 571536 43261216 27. 4808452 9. 1077069 0.0138281 757 757 57349 435796936 27. 5136330 9. 1137318 0.01382104 758 574564 43551512 27. 5136330 9. 1137318 0.01382104 758 574564 43551512 27. 5136330 9. 1137318 0.0138260 759 576061 437345479 27. 5439646 9. 1218010 0.013132851 759 576061 440711081 27. 5858284 9. 1238061 0.013132851 758 559044 4442450728 27. 5048646 9. 1327077 0.001312856 766 585826 447697125 27. 5048646 9. 1327077 0.001310616 440471081 27. 7684549 9. 1417874 0.001310616 766 588266 445948540 27. 575750 9. 14675742 0.001312856 766 588284 445864882 27. 75284549 9. 1457742 0.001312856 766 588284 445864882 27. 75284549 9. 1457742 0.001312856 766 588285 447697125 27. 6846884 9. 1537757 0.001312856 766 588285 447697125 27. 6846884 9. 1537757 0.001312856 766 588285 447697125 27. 6846884 9. 1537757 0.001312856 767 588289 45121768 27. 7684689 9. 1417874 0.001312856 766 588285 447697125 27. 6846884 9. 1537757 0.001312856 766 588285 447697125 27. 6846884 9. 1537757 0.001312856 766 588285 447697125 27. 6846884 9. 1537757 0.001312856 766 588285 447697125 27. 6846884 9. 1537757 0.001312856 766 588285 447697125 27. 6846884 9. 1537757 0.001312856 766 588285 447697125 27. 6846884 9. 1537757 0.001312856 766 588285 447697125 27. 6846884 9. 1537735 0.001312856 766 588285 447697125 27. 6846884 9. 1537735 0.001312856 776 588285	745	555025		27.2946881	9.0653677	.001342282
748 556504 418506992 27.3495847 9.0775197 .00138618 749 561001 420189749 27.3878844 9.061681 .00138518 750 562500 421875000 27.3861279 9.0666930 .001383838 751 564001 423564751 27.4043792 9.0666930 .001383838 752 565504 42856008 27.4226184 9.0666930 .001383937 753 567009 426657777 27.406455 9.0977010 .001382021 754 568514 428661004 27.459604 9.107669 .001382021 755 570025 430368161 27.54946432 9.1067645 .001382460 757 573049 438796038 27.5136330 9.1187318 .0013821004 759 576081 438976000 27.6499646 9.1218010 .00131758 761 579121 440711081 27.586294 9.128803 .001316789 762 580444 442450728 27.6043475 9.138804			415160936			.001840483
749 561001 420180749 27.3878944 9.0616831 .001885118 750 562500 421875000 27.3861279 9.066609 .001838383 751 564001 423564751 27.4043792 9.066609 .001838383 752 565504 42525008 27.4226184 9.0986719 .001839767 753 567009 426957777 27.4404545 9.0986719 .001839767 754 568516 428661064 27.4590604 9.1017865 .001824508 755 570025 4303686875 27.4772883 9.1067465 .001824508 756 571536 429061216 27.4595604 9.1017865 .001824508 757 573 573049 428759608 27.5183830 9.1187818 .001821004 758 574564 428510612 27.5817986 9.1187818 .001821004 758 576061 438967600 27.5680875 9.128903 .001815789 761 57790 438976000 27.5680264 9.128903 .001815789 761 5779121 440711061 27.5862284 9.1289061 .001814668 763 582169 444194947 27.624546 9.1217971 .001810816 763 582169 444194947 27.624546 9.1377971 .001810816 764 583898 44594574 27.6405499 9.147874 .001810816 765 588225 447697125 27.6580384 9.1457742 .001809801 766 588225 447697125 27.6580384 9.1457742 .001809801 767 588289 451917868 27.6580384 9.1457742 .001809801 768 589284 44594500 27.75868384 9.1457742 .001809801 769 591861 45686600 27.7687050 9.1167869 .00180568 769 591861 45686000 27.7687050 9.1167869 .00180568 769 591861 45686000 27.7687050 9.1167869 .00180568 769 68900 456838000 27.7488789 9.166665 .001286701 771 594441 458814011 27.768868 9.1167856 .001286701 772 589694 46009648 27.7888789 9.166665 .001286701 773 600625 46584832 27.888890 9.1755862 .001286701 774 599076 46588884 27.888890 9.1755862 .001280803 778 600640 474583000 27.7488789 9.166665 .001286701 778 606264 478811788 27.9488779 9.188477 .001805847 779 606841 47871789 27.948879 9.166665 .001286701 770 59900 456858000 27.767806 9.1840779 9.1085847 779 606841 47871789 27.948879 9.166665 .00128670 .001286870 778 606260 478658000 27.7888789 9.166665 .00128670 .001286807 778 606264 4989000 27.788869 9.1884087 .001286807 779 606841 4787898 27.948889 9.258665 .001287701 778 606264 4989000 27.7888789 9.1666665 .00128697 .001286807 779 606841 47878988 27.948898 9.258779 .001286807 789 63800 45600000 27.7888797 9.2888777 9.128						
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752 565504 42259008 27.428184 9.0897191 001839787 754 568516 428661084 27.4590604 9.1017285 001328021 755 570025 4296861084 27.4590604 9.1017285 001328280 756 571596 4393981216 27.484542 9.1067485 001328408 757 573049 438798083 27.5136330 9.1137801 001321004 758 575061 4387845479 27.5498446 9.1217981 001317523 760 577600 438976000 27.5802975 9.1259063 001317523 761 579121 440711081 27.5862284 9.1259063 001317523 763 582169 444149447 27.624563 9.1389064 00131903 764 583966 445943744 27.624549 9.1417874 001307190 766 585225 447667125 27.686934 9.1497576 001306483 767 588294 451217663 27.694768 9.167576 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td></td<>						
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805 648025 521660125 28.3725219 9.8024775 .001242286				28.3548938	9.2986239	.001243781
806 649686 523606616 28.3901391 9.8063278 .001340695			521660125	28.3725219	9.8024775	.001242286
	806	649636	523606616	28.3901391	9.8068278	

No.	Squares.	Cubes.	Square Roots,	Cube Roots.	Reciprocals.
807 808 809	651249 652864 654481	525557948 527514112 529475129	28.4077454 28.4258408 28.4429258	9.3101750 9.3140190 9.3178599	.001239157 .001237624 .001236094
810	656100	581441000	28.4604989	9.8216975	.001234568
811	657721	588411781	28.4780617	9.8255320	.001283046
812 818	659844 660969	585387828 587367797	28.4956187 28.5131549	9.8293634 9.8331916	001231527 .001230012
814	662596	539358144	28.5306852	9.8370167	.001228501
815	664225	541848375	28.5482048	9.3408386	.001226994
816	665856 667489	548888496 54588518	28.5657137 28.5832119	9.3446575 9.3484731	.001225490
817 818	669124	547843432	28.6006998	9.8522857	.001222494
819	670761	549853259	28.6181760	9.8560952	.001221001
820	672400	551368000	28.6356421	9.3599016	.001219512
821	674041	558387661	28.6580976	9.3637049	.001218027
822	675684	555412248	28.6705424	9.3675051	.001216545
828 824	677829 678976	557441767 559476224	28.6879766 28.7054002	9.3713022 9.3750963	.001215067 .001218592
. 825	680625	561515625	28.7228132	9.3788878	.001212121
826	682276	568559976	28.7402157	9.3826752	.001210654
827 828	683929 685584	565609288 567668552	28.7576077	9.3864600 9.3902419	.001209190 .001207729
829 829	687241	569722789	28.7749891 28.7923601	9.3940206	.001206273
880	688900	571787000	28.8097206	9.3977964	.001204819
881	690561	573856191	28.8270706	9.4015691	.001204019
832	692224	575980868	28.8444102	9.4053387	.001201923
888	698889	578009587	28.8617894	9.4091054	.001200480
884 885	695556 697325	580093704 582182875	28.8790582 28.8968666	9.4128690 9.4166297	.001199041
886	698896	584277056	28.9186646	9.4203873	.001196172
887	700569	586876258	28.9909523	9.4241420	.001194743
838 839	702244	588480472 590589719	28.9482297 28.9654967	9.4278936 9.4316423	.001193817 .001191895
840 841	705600	592704000 594823821	28.9827585 29.0000000	9.4353880 9.4391807	.001190476
842	708964	596947688	29.0172868	9.4428704	.001187648
848	710649	599077107	29.0344628	9.4466072	.001186240
844 845	712886 714025	601211584	29.0516781 29.0688887	9.4508410	.001184884
846	715716	608851125 605495786	29.0860791	9.4540719 9.4577999	.001182088
847	717409	607645428	29.1082644	9.4615249	.001180688
848	719104	609800192 611960049	29.1204896	9.4652470	.001179245
849	790801		29.1876046	9.4689661	.001177856
850 851	722500 724201	614125000 616295051	29.1547595	9.4726824 9.4763957	.001176471
825 201	725904	618470208	29.1719043 29.1890890	9.4801061	.001178709
858	727609	620650477	29.2061637	9.4838136	.001172333
854	729816	622835864	29.2232784	9.4875182	.001170960
855 856	781025 782786	625026375 627222016	29.2408830 29.2574777	9.4912200 9.4949188	.001169591 .001168224
867	784449	629422798	29.2745628	9.4986147	.001166861
858	786164	631628712	29.2916370	9.5028078	.001165501
859	787881	633839779	29.3087018	9.5059980	.001164144
860	789600	686056000	29.8257566	9.5096854	.001162791
861 862	741821 748044	638277381 640508928	29.8428015 29.8598865	9.5133699 9.5170515	.001161440 .001160098
868	744769	642735647	29.3768616	9.5207303	.001158749
864 ·	746496	644972544	29.8988769	9.5244063	.001157407
865	748225	647214625	29.4108823	9.5280794	.001156069
866 867	749956 751689	649461896 651714868	29.4278779 29.4448687	9.5817497 9.5854172	.001154784 .001158408
868	758494	658979082	29.4618397	9.5390818	.001152074

TABLE VIII.—SQUARES, CUBES, SQUARE ROOTS.

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals
869	755161	656234909	29.4788059	9.5427437	.001150748
870	756900	658508000	29.4957624	9.5464027	.001149425
871	758641	660776811	29.5127091	9.5500589	.001148106
872	760384	663054848	29.5296461	9.5537123	.001146789
878	762129	665388617	29.5465784	9.5573630	.001145475
874	763876	667627624	29.5684910	9.5610108	.001144165
875	765625	669921875	29.5808989	9.5646559	.001142857
876	767376	672221376	29.5972972	9.5682982	.001141558
877	769129	674526133	29.6141858	9.5719377	.001140251
878	770884	676836152	29.6310648	9.5755745	.001138952
879	772641	679151439	29.6479842	9.5792085	.001187656
880	774400	681472000	29.6647939	9.5828397	.001136864
881	776161	683797841	29.6816442	9.5864682	.001135074
888	777994	686128968	29.6984848	9.5900989	.001138787
883	779689	688465887	29.7158159	9.5937169	.001132503
884 884	781456	690807104	29.7321875 29.7489496	9.5973378	.001131222
885 886	783225 784996	698154125 695506456	29.7657521	9.6009548 9.6045696	.001129944
887	786769	697864108	29.7825452	9.6081817	.001127896
888	788544	700227072	29.7993289	9.6117911	.001126126
889	790821	702595869	29.8161030	9.6158977	.001124859
890	792100	704969000	29.8328678	9.6190017	.001123596
891	798881	707847971	29.8496281	9.6226030	.001122334
892	795664	709732288	29.8663690	9.6262016	.001121076
898	797449	712121957	29.8831056	9.6297975	.001119821
894	799236	714516984	29.8998328	9.6888907	.001118568
895	801025	716917375	29.9165506	9.6369812	.001117818
896	802816	719823186	29.9332591	9.6405690	.001116071
897	804609	721784278	29.9499588	9.6441542	.001114827
898 899	806404 808201	724150792 726572699	29.9666481 29.9838287	9.6477367 9.6518166	.001118586
900	810000	729000000	80.0000000	9.6548988	.001111111
901	811801	731482701	30.0166620	9.6584684	.001109878
902	818604	733870808	80.0883148	9.6620408	.001108647
908	815409	786814827	30.0499584	9.6656096	.001107420
904	817216	738768264	30.0665928	9.6691762	.001106195
905 906	819025 820836	741217625 748677416	30.0832179 30.0998339	9.6727408 9.6768017	.001104972
907	822649	746142648	80.1164407	9.6768017 9.6798604	.001102586
908	824464	748618812	30.1330383	9.6884166	.001101822
909	826281	751089429	30.1496269	9.6869701	.001100110
910	828100	758571000	80.1662068	9.6905211	.001098901
911	829921	756058031	80.1827765	9.6940694	.001097695
912	831744	758550528	80.1998877	9.6976151	.001096491
918	888569	761048497	30.2158899	9.7011588	.001095290
914 915	885396 887225	763551944 766060875	30.2324329 30.2489669	9.7046989 9.7082369	.001094092
916 916	839056	768575296	30.2654919	9.7062309	.001092390
917	840889	771095213	30.2820079	9.7158051	.001090518
918	842724	778620632	80.2985148	9.7188854	.001089896
919	844561	776151559	80.3150128	9.7228681	.001088189
920	846400	778688000	80.8815018	9.7258888	.001086957
921	848241	781229961	80.8479818	9.7294109	.001085776
922 923	850084 851929	788777448 786380467	80.8644529 80.8809151	9.7829809 9.7864484	.001084599
924	853776	788889024	30.3973683	9.7399684	.001083438
925	855625	791458125	80.4188127	9.7484758	.001082831
926	857476	794022776	30.4302481	9.7469857	.001079914
927	859829	796597988	80.4466747	9.7504990	.001078749
928	861184	799178752	30.4630924	9.7589979	.001077588
929	868041	801765089	80.4795018	9.7575002	.001076496

	1 1			1	1
No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
931	866781	806954491	30.5122926	9.7644974	.001074114
932	868624	800557568	30.5286750	9,7679922	.001072961
933	870489	812166237	30.5450487	9.7714845	.001071811
984	872356	814780504	80.5614136	9.7749743	.001070664
985	874225	817400875	80.5777697	9.7784616	.001069519
986	876096	820025856	80.5941171	9.7819466	.001068376
987	877969	822656958	30.6104557	9.7854288	.001067236
988	879844	825298672	30.6267857	9.7889087	.001066098
939	881721	827986019	30.6431069	.9.7923961	.001064968
940	883600	880584000	80.6594194	9.7958611	.001063830
941	885481	833237621	30.6757288	9.7998886	.001062699
942	887364	835896888	30.6920185	9.8028036	.001061571
943	889249	838561807	80.7083051	9.8062711	.001060445
944	891136	841232384	£0.7245830	9.8097362	.001059322
945	893025	843908625	80.7408523	9.8131989	.001058201
946	894916	846590536	80.7571180	9.8166591	.001057082
947	896809	849278123	30.7733651	9.8201169	.001055966
948	898704	851971392	80.7896086	9.8235723	.001054852
949	900601	854670849	80.8058436	9.8270252	.001058741
950	902500	857875000	80.8220700	9.8304757	.001052632
951	904401	860085351	30.8382879	9.8339238	.001051525
952	906304	862801408	80.8544972	9.8373695	.001050420
953	908209	865523177	30.8706981	9.8408127	.001049318
954	910116	868250664	80.8868904	9.8442536	.001048218
955	912025	870983875	80.9030743	9.8476920	.001047120
956	913936	873722816	80.9192497	9.8511280	.001046025
957	915849	876467498	30.9354166	9.8545617	.001044982
958	917764	879217912	80.9515751	9.8579929	.001048841
959	919681	881974079	80.9677251	9.8614218	.001042758
960	921600	884786000	80.9838668	9.8648483	.001041667
961	923521	887503681	31.0000000	9.8682724	.001040583
962	925444	890277128	81.0161248	9.8716941	.001039501
963	927369	893056847	81.0322418	9.8751135	.001038422
964	929296	895841844	31.0483494	9.8785805	.001037344
965	981225	898632125	81.0644491	9.8819451	.001036269
966	983156	901428696	81.0805405	9.8853574	.001085197
967	985089	904231063	31.0966236	9.8887673	.001084126
968	987024	907039232	81.1126984	9.8921749	.001033058
969	988961	909853209	81.1287648	9.8955801	.001081992
970	940900	912673000	81.1448280	9.8989880	.001030928
971	942841	915498611	81.1608729	9.9028835	.001029866
972	944784	918880048	81.1769145	9.9057817	.001028807
978	946729	921167817	81.1929479	9.9091776	.001027749
974	948676	924010424	81.2089781	9.9125712	.001026694
975	950625	926859375	81.2249900	9.9159624	.001025641
976	952576	929714176	81.2409987	9.9198513	.001024590
977	954529	932574833	31.2569992	9.9227879	.001023541
978 979	956484 958441	985441852 988818789	81.2729915 81.2889757	9.9261222 9.9295042	.001022495
	960400		81.3049517	9.9328889	.001021450
980	962361	941192000	81.8049617	9.9862618	.001020408
981		944076141		9.9396363	.001018880
982	964324	946966168	81.3368792 81.3528308	9,9430092	.001016330
988	966289	949862087			
984	968256	952763904	81.3687748	9.9463797	.001016260
985	970225	955671625	81.3847097	9.9497479	.001015228
986	972196	958585256	31.4006369	9.9531138	.001014199
987	974169	961504803	81.4165561	9.9564775	.001013171
988 989	976144 978121	964430272 967361669	81.4324678 81.4488704	9.9598889 9.9681981	.001012146
990	980100	970299000	81.4642654	9.9665549	.001010101
		973242271	81.4801525	9.9699095	.001009082
991	982081	B10%#%%11	01.4001020		

. TABLE VIII.—SQUARES, CUBES, ETC.

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
998	986049	979146657	81.5119025	9.9766120	.001007049
994	988086	982107784	31.5277655	9.9799599	.001006036
995 996	990025 992016	985074875 988047936	31.5436206 81.5594677	9.9888055 9.9866488	.001005025
990 997	994009	991026973	81.5753068	9.9899900	.001004016
998	996004	994011992	31.5911380	9.9983289	.001002004
999	998001	997002999	31.6069613	9.9966656	.001001001
1000	1000000	1000000000	31.6227766	10.0000000	.001000000
1001 1002	1002001 1004004	1003003001 1006012008	31.6385840 31.6543836	10.0088322 10.0066622	.0009990010
1003	1006009	1009027027	81.6701752	10.0000022	.0009970090
1004	1008016	1012.48064	31.6859590	10.0188155	.0009960159
1005	1010025	1015075125	81.7017349	10.0166389	.0009950249
1006	1012036	1018108216	31.7175080	10.0199601	.0009940358
1007	1014049	1021147848	81.7332633	10.0232791	.0009930487
1008	1016064	1024192512	31.7490157 81.7647608	10.0265958 10.0299104	.0009920635
1009 1010	1018081 1020100	1027243729 1080301000	81.7804972	10.0832228	.0009910808
1011	1022121	1033364331	31.7962262	10.0365330	.0009891197
1012	1024144	1036433728	31.8119474	10.0898410	.0009881423
1013	1026169	1089509197	81.8276609	10.0481469	.0009871668
1014 1015	1028196 1030225	1042590744 1045678375	31.8433666 31.8590646	10.0464506 10.0497521	.0009861933
1015	1082256	1048772096	31.8747549	10.0580514	.0009832217
1017	1034289	1051871913	81.8904374	10.0568485	.0009632842
1018	1036324	1054977832	81.9061123	10.0596485	.0009823183
1019	1038361	1058089859	81.9217794	10.0629364	.0009818548
1020	1040400	1061208000	81.9374388	10.0662271	.0009803922
1021	1042441	1064332261	81.9530906	10.0695156	.0009794319
1022 1023	1044484 1046529	1067462648 1070599167	31.9687347 31.9843712	10.0728020 10.0760863	.0009784786
1024	1048576	1078741824	32.0000000	10.0798684	.0009765625
1025	1050625	1076890625	32.0156212	10.0826484	.0009756098
1026	1052676	1080045576	32.0312348	10.0859262	.0009746589
1027	1054729	1083206683	32.0468407	10.0892019	.0009787098
1028 1029	1056784	1086373952 1089547389	32.0624391	10.0924755	.0009727626
1030	1058841 1060900	1092727000	32.0780298 32.0936131	10.0957469 10.0990163	.0009718178
1031	1062961	1095912791	32,1091887	10.1022835	.0009699821
1032	1065024	1099104768	82.1247568	10.1055487	.00.9689922
1033	1067089	1102302987	82.1408178	10.1088117	.0009680542
1034 1035	1069156	1105507304	82.1558704 99.1714150	10.1120726	.0009671180
1036	1071225 1073296	1108717875 1111934656	82.1714159 82.1869539	10.1158814 10.1185882	.0009661836 .0009652510
1037	1075369	1115157653	82.2024844	10.1218428	.0009643202
1088	1077444	1118386872	82.2180074	10.1250958	.0009633911
1089	1079521	1121622319	82.2335229	10 .1283457	.0009624639
1040	1081600	1124864000	32.2490310	10.1815941	.0009615885
1041 1042	1083681 1085764	1128111921 1131366088	32.2645316 32.2800248	10.1348408 10.1380845	.0009606148
1043	1087849	1134626507	82.2955105	10.1350645	.0009587738
1044	1089936	1137893184	32.3109888	10.1445667	.0009578544
1045	1092025	1141166125	32.3264598	10.1478047	.0009569378
1046	1094116	1144445386	82.3419233	10.1510406	.0009560229
1047 1048	1096209 1098304	1147780823	32.3573794 32.3728281	10.1542744	.0009551098
1049	1100401	1151022592 1154820649	82.3882695	10.1575062 10.1607859	.0009541985
1050	1102500	1157625000	32.4037035	10.1689686	.0009523810
1051	1104601	1160985651	82.4191301	10.1671898	.0009514748
1052	1106704 1106809	1164252608 1167575877	82.4845495	10.1704129	.0009505708
1058			82.4499615	10.1736344	.0009496676

No.	100 L. 00	U. J							N	o. 109	L. 040
N.	0	1	2	8	4	5	6	7	8	9	Diff
100 1 2	000000 4321 8600	0434 4751 9026	0868 5181 9451	1301 5609 9876	1784 6038	2166 6466	2598 6894	3029 7321	8461 7748	8891 8174	482
8 4	012837 7033	3259 7451	3680 7868	4100 8284	0300 4521 8700	0724 4940 9116	1147 5360 9532	1570 5779 9947	1993 6197	2415 6616	424 420
5 6 7	021189 5306 9384	1608 5715 9789	2016 6125	2428 6533	2841 6942	8252 7850	3664 7757	4075 8164	0861 4486 8571	0775 4896 8978	416 412 406
8 9	083424 7426	3826 7825	0195 4227 8223	0600 4628 8620	1004 5029 9017	1408 5430 9414	1812 5830 9811	2216 6230	2619 6629	8021 7028	404 400
•	04	1			***			0207	0602	0998	397

PROPORTIONAL PARTS.

									
Diff.	1	2	8	4	5	6	7	8	9
484	48.4	86.8	180.2	178.6	217.0	260.4	803.8	347.2	890.6
488	43.8	86.6	129.9	178.2	216.5	259.8	303.1	846.4	389.7
432	48.2	86.4	129.6	172.8	216.0	259.2	802.4	845.6	888.8
431	43.1	86.2	129.3	172.4	215.5	258.6	801.7	844.8	887.9
430	48.0	86.0	129.0	172.0	215.0	258.0	801.0	844.0	387.0
429	42.9	85.8	128.7	171.6	214.5	257.4	800.8	843.2	386.1
428	42.8	85.6	128.4	171.2	214.0	256.8	299.6	842.4	885.2
427	42.7	85.4	128.1	170.8	218.5	256.2	298.9	841.6	884.8
426 425	42.6	85.2	127.8	170.4	218.0	255.6 255.0	293.2	340.8	888.4
	42.5	85.0	127.5	170.0	212.5		297.5	840.0	382.5
424	42.4	84.8	127.2	169.6	212.0	254.4	296.8	889.2	381.6
423	42.8	84.6	126.9	169.2	211.5	253.8	296.1	838.4	880.7
422	42.2	84.4	126.6	168.8	211.0	253.2	295.4	837.6	879.8
421	42.1	84.2	126.3	168.4	210.5	252.6	294.7	886.8	878.9
420	42.0	84.0	126.0	168.0 167.6	210.0	252.0	294.0	836.0	878.0
419 418	41.9 41.8	83.8 88.6	125.7 125.4	167.0	209.5 209.0	251.4 250.8	293.3 292.6	835.2 834.4	377.1 376.2
417	41.7	88.4	125.4	166.8	208.5	250.8	291.9	833.6	375.3
416	41.6	83.2	124.8	166.4	208.0	249.6	291.2	832.8	874.4
415	41.5	88.0	124.5	166.0	207.5	249.0	290.5	832.0	373.5
414 418	41.4	82.8 82.6	124.2 123.9	165.6 165.2	207.0 206.5	248.4 247.8	289.8 289.1	881.2 830.4	872.6 871.7
412	41.8	82.4	123.9	164.8	206.0	247.8	288.4	329.6	370.8
411.	41.1	82.2	128.3	164.4	205.5	246.6	287.7	828.8	869.9
410	41.0	82.0	128.0	164.0	205.0	246.0	287.0	828.0	369.0
409	40.9	81.8	122.7	163.6	204.5	245.4	286.8	827.2	868.1
408	40.8	81.6	122.4	163.2	204.0	244.8	285.6	826.4	367.2
407	40.7	81.4	122.1	162.8	208.5	244.2	284.9	825.6	866.8
406	40.6	81.2	121.8	162.4	203.0	243 6	284.2	824.8	365.4
405	40.5	81.0	121.5	162.0	202.5	243.0	283.5	824.0	364.5
404	40.4	80.8	121.2	161.6	202.0	242.4	282.8	323.2	868.6
408	40.8	80.6	120.9	161.2	201.5	241.8	282.1	822.4	362.7
402	40.2	80.4	120.6	160.8	201.0	241 2	281.4	321.6	361.8
401	40.1	80.2	120.3	160.4	200.5	240.6	280.7	320.8	360.9
400	40.0	80.0	120.0	160.0	200.0	240.0	280.0	820.0	360.0
899	39.9	79.8	119.7	159.6	199.5	239.4	279.8	819.2	859.1
898	39.8	79.6	119.4	159.2	199.0	238.8	278.6	818.4	358.2
897	39.7	79.4	119.1 118.8	158.8 158.4	198.5 198.0	238.2 237.6	277.9 277.2	317.6 316.8	857.8 856.4
896 895	39.6 39.5	79.2	118.5	158.0	197.5	287.0	276.5	816 0	355.5
-	1 08.0	10.0	110.0	1 100.0	1 101.0	. 201.0	. 2.0.0	. 010 0	

₹o. :	110	L. 041] ———							[No	. 119 I	. 078.
N.		•	1	2	8	4	5	6	7	8	9	Diff.
10 1 2	04	1393 5323 9218	1787 5714 9606	2182 6105 9993	2576 6495		3362 7275	8755 7664	4148 9058	4540 8442	4982 8830	393 390
34	05	53078 6905	3463 7286	3846 7666	0380 4230 8046	4613	1153 4996 8805	1588 5378 9185	1924 5760 9563	2309 6142 9942	2694 6524	386 383
5	06	30698 4458 8186	1075 4832 8557	1452 5208 8928	1829 5580 9298	5958	2582 6326	2958 6699	8833 7071	3709 7443	0820 4088 7815	379 876 873
89	o	71882 5547	2250 5912	2617 6276	2985 6640	3352	0088 3718 7368	0407 4085 7781	0776 4451 8094	1145 4816 8457	1514 5182 8819	370 366 868
					PB	oportio	NAL PA	RTS.	<u> </u>	•		<u></u>
Dif	r.	1	2		8	4	5	6		7	8	9
395 894 899 899 899 899 886 886 886 887 877 877 877 877 877 877		39.5 39.4 39.2 39.2 39.1 38.8 38.6 38.5 38.6 38.5 38.7 38.6 38.7 38.7 37.7 37.7 37.6 37.8 37.8 37.8 37.9 37.8 37.8 37.8 37.8 38.8 38.8 38.8 38.8	79.6 78.8 78.4 78.4 78.5 77.6 77.5 77.6 77.6 76.6 76.6 75.6 75	111111111111111111111111111111111111111	18.5 18.2 17.9 17.6 17.8 17.0 16.7 16.4 16.5 16.5 16.5 16.8 16.8 16.8 16.8 16.8 16.8 16.8 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9 16.9	158.0 157.6 157.2 156.8 156.4 156.4 156.5 154.8 154.0 153.6 153.2 152.4 152.0 151.6 151.2 152.4 152.4 152.4 154.0 149.2 148.8 148.4 148.6 147.2 148.8	197.5 197.0 196.5 198.0 194.5 194.5 194.5 192.0 191.8 192.0 190.8 189.5 188.0 187.0 187.0 187.0 186.1 187.0 186.1 187.0	231 233 233	.4 .8 .2 .6 .0 3.4 2.8 2.2	276.5 276.8 276.8 276.1 274.4 273.7 273.7 273.7 273.7 273.7 273.7 273.7 273.7 273.7 270.9 270.9 269.5 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 268.8 269.7 269.7 269.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7 259.7	816.0 815.2 814.4 818.6 812.8 812.0 811.2 809.6 806.0 807.2 806.4 806.6 804.0 806.2 806.4 804.0 806.2 802.4 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8 800.8	332
36 36 36 36 36 36 35 35	8 4 8 1 9 8 7	36.6 36.5 36.4 36.3 36.2 36.1 36.0 35.9 35.8 35.8	78. 78. 72. 72. 72. 72. 71.	2 1 0 1 8 1 6 1 2 1 0 8 6 1	109.8 109.5 109.2 108.9 108.6 108.3 108.0 107.7 107.4	146.4 146.0 145.6 145.2 144.8 144.4 144.6 143.6 148.2 142.8	183.0 182.0 181.0 181.0 180.0 179.0 179.0 178.0	21 21 21 21 21 21 21 21 21 21 21 21 21 2	9.6 9.0 8.4 7.8 7.2 6.6 6.0 5.4 4.8 4.2 8.6	256.2 255.7 254.8 254.1 253.4 252.7 252.0 251.3 250.6 249.9	292.8 292.0 291.3 290.4 289.6 288.8 288.0 287.2 286.4 285.6	829. 828. 827. 826. 895. 824. 824. 828.

No.	120 L. 0	79.]							[1	No. 184	L. 180.	
N.	0	1	8	8	4	5	6	7	8	9	Diff.	
120	079181	9543	9904			0987	1847	1707	9067	2426	860	
1 2	082785 6360	8144 6716	8508 7071	026 386 742	1 4219	4576 8136	4984 8490	5291 8845	5647 9198	6004 9552	357 355	
8 4 5	9905 098422 6910	0258 8772 7257	0611 4122 7604	096 447 795	1 4820	1667 5169 8644	2018 5518 8990	2370 5866 9335	2721 6215 9681	3071 6563	852 849	
6	100871 8804	0715 4146	1059 4487	140 482	3 1747 8 5169	2091 5510	2434 5851	2777 6191	8119 6581	0026 3462 6871	346 343 341	
9	7210	7549	7988 1968	159		2270	9241 2605	9579 2940	9916 8275	0258 8609	838 885	
180	8948 7871	4277 7608	4611 7984	494 826	4 5278	5611 8926	5943 9256	6276 9586	6608 9915	6940	333	
2 8	190574 3852 7105	0908 4178 7429	1281 4504 7758	156 488 807	0 1888 0 5156	2216 5461 8722	2544 5806 9045	2871 6131 9368	8198 6456 9690	0245 3525 6781	330 328 325	
	18			-		0.20	0020		5000	0012	823	
PROPORTIONAL PARTS.												
Diff.	. 1	8	8	.	4	5	6		7	8	9	
855 854 853 852 851 850 849 848 847 846	85°5 85.4 85.3 85.2 85.1 85.0 84.9 84.8 84.7 84.6	71.0 70.8 70.6 70.4 70.9 70.0 69.8 69.6 69.4 69.2	106 106 106 106 106 106 104 104 104 108	3.8 5.9 5.6 5.8 5.0 1.7 1.4	142.0 141.6 141.2 140.8 140.4 140.0 189.6 189.2 138.8 188.4 138.0	177.5 177.0 176.5 176.0 175.5 175.0 174.5 174.0 178.5 178.0	218. 212. 211. 211. 210. 210. 209. 208. 208. 207.	4 24 8 24 6 24 6 24 0 24 4 24 8 24 8 24 8 24	8.5 17.8 17.1 16.4 15.7 15.0 14.8 18.6 12.9 12.9	284.0 283.2 282.4 281.6 280.8 280.0 279.2 278.4 277.6 276.8	819.5 818.6 817.7 816.8 815.9 815.0 814.1 818.2 812.8 811.4	
844 843 843 841 840 839 838 837 836	34.4 84.8 84.2 84.1 84.0 88.9 88.8 88.7 88.6	68.8 68.6 68.4 68.2 68.0 67.8 67.6 67.4	108 108 108 108 108 108 101 101 101	.2 .9 .6 .8 .0 .7 .4	137.6 137.2 186.8 136.4 136.0 185.6 185.2 184.8	172.0 171.5 171.0 170.5 170.0 169.5 169.0 168.5 168.0	206 . 205 . 205 . 204 . 204 . 208 . 202 . 202 .	4 24 8 24 2 28 6 23 0 28 4 28 8 23 2 28	0.8 0.1 9.4 8.7 8.0 7.8 6.6 5.9	275.2 274.4 273.6 272.8 272.0 271.2 270.4 269.6 268.8	309.6 308.7 307.8 306.9 306.0 305.1 304.2 303.3 302.4	
835 834 833 882 881 880 829 828 827 826	83.5 88.4 88.8 88.2 88.1 88.0 88.9 88.8 88.7 82.6	67.0 66.8 66.6 66.4 66.2 65.0 65.8 65.6 65.4 65.2	99 99 99 98 98		184.0 188.6 188.2 182.8 182.4 182.0 181.6 181.2 180.8 180.4	167.5 167.0 166.5 166.0 165.5 165.0 164.5 164.0 163.5 168.0	201.0 200.4 199.5 198.0 198.0 197.4 196.5 196.5	4 23 8 23 8 23 6 23 6 23 0 23 4 23 8 22 2 22	4.5 3.8 8.1 2.4 1.7 1.0 0.8 9.6 8.9 8.9	268.0 267.2 266.4 265.6 264.8 264.0 263.2 262.4 261.6 260.8	501.5 800.6 299.7 298.8 297.9 297.0 296.1 295.2 294.8 298.4	
325 324 328 338	82.5 82.4 82.8 82.8	65.0 64.8 64.6 64.4	97	.5 .2 .9	180.0 129.6 129.2 128.8	162.5 162.0 161.5 161.0	195.0 194.4 198.8 198.8	1 22	7.5 6.8 6.1 5.4	260.0 259.2 258.4 257.6	292.5 291.6 290.7 289.8	

1	35 L. 18	,				ii .					o. 149	
N.	0	1	2	8	4	5	6	7		8	9	Diff.
35 6 7	130334 3539 6721	0655 3858 7037	0977 4177 7354	129 449 767	6 4814	1939 5133 8303	2260 5451 8618	258 576 898	9 6	1900 1086 1249	8219 6408 9564	821 818 816
8	9879				_	l			'	2389	2702	314
9	143015	0194 8327	0508 3639	082 393		1450 4574	1763 4885	207 519		507	5818	311
40	6128 9219	6438 9527	6748 9835	700	8 7367	7676	7985	829	4 8	3608	8911	300
2	152288	2594	2900	014 320		0756 8815	1068 4120	187 442		676 1728	1982 5082	307
3 4	5336 8362	5640 8664	5948 8965	624 926	6 6549	6852 9868	7154	74		759	8061	308
5	161368	1667	1967	226		2863	0168 3161	046 346	0 8)769 3758	1068 4055	301 299
6	4353 7317	4650 7613	4947 7908	524 820		5838 8792	6134 9086	648 938	10 6	3726 3674	7022 9968	297 290
8	170262 3186	0555 8478	0848 8769	114 406		1726 4641	2019 4932	231 525		2603 5512	2895 5802	293 291
!			·	Pı	ROPORTIO	NAL PA	RTS.	!			1	!
Diff.	1	2	1	В	4	5	6		7		8	9
821	32.1	64.2	96	.8	128.4	160.5	192	6	224.	7	256.8	288.9
320 319	32.0 31.9	64.0 63.8	96 95	.7	128.0 127.6	160.0 159.5	192 191	4	224. 223.	8	256.0 255.2	288.0 287.1
318 317	81.8 31.7	63.6 63.4	95	.1	127.2 126.8	159.0 158.5	190 190	2	222. 221.	9	254.4 253.6	286.2 285.8
316 815	31.6 31.5	63.2 63.0	94 94	.5	126.4 126.0	158.0 157.5	189	0	221. 220.	5	252.8 252.0	284.4 283.5
314 813 312	81.4 31.3 81.2	62.8 62.6 62.4	94 93 93	.9	125.6 125.2 124.8	157.0 156.5 156.0	188 187 187	8	219. 219. 218.	1	251.2 250.4 249.6	282.6 281.7 280.8
311	81.1	62.2	93	.8	124.4	155.5	186	.6	217.	7	248.8	279.8
310 309	31.0 30.9	62.0 61.8	93	.7	124.0 123.6	155.0 154.5	186 185	4	217. 216.	3	248.0 247.2	279.0 278.1
308 307	30.8	61.6 61.4	92	.1	123.2 122.8	154.0 153.5	184 184	2	215. 214.	9	246.4 245.6	277.2
306 3 05	30.6 80.5	61.2 61.0	91 91		122.4 122.0	153.0 152.5	188 188		214. 213.	5	244.8 244.0	275.4 274.5
304 303	30.4 30.3	60.8 60.6	91 90	.2 .9	121.6 121.2	152.0 151.5	182 181		212. 212.	8	243.2 242.4	273.6 272.7
302 301	80.2 30.1	60.4 60.2	90	.6	120.8 120.4	151.0 150.5	181	- 1	211.	4	241.6	271.8
300 299	30.0 29.9	60.0 59.8	90	.0	120.4 120.0 119.6	150.0	180 180	0	210. 210.	0	240.8 240.0	270.9
298 297	29.8 29.7	59.6	89	.4	119.2	149.5 149.0	179 178	.8	209. 208.	6	239.2 238.4	269.1 268.2
296	29.6	59.4 59.2		.8	118.8 118.4	148.5 148.0	178	.6	207. 207.	2	237.6 236.8	267.8 266.4
295 294	29.5 29.4	59.0 58.8	88	.2	118.0 117.6	147.5 147.0	177 176	4	206. 205.	8	236.0 235.2	265.8 264.6
293 292	29.3 29.2	58.6 58.4	87 87	.6 .6	117.2 116.8	146.5 146.0	175 175	2	205. 204.		234.4 233.6	263.7 262.8
291 290	29.1 29.0	58.2 58.0	87	.0	116.4 116.0	145.5 145.0	174 174	0	208. 208.	0	232.8 232.0	261.9 261.0
289 288	28.9 28.8	57.8 57.6	86 86	.7	115.6 115.2	144.5 144.0	178 172	.4	202. 201.	3	231.2 230.4	260.1 259.2
287 286	28.7 28.6	57.4 57.2	86 85		114.8 114.4	143.5 143.0	172 171	2	200. 200.	9	229.6 228.8	258.8 257.4

TABLE IX.-LOGARITHMS OF NUMBERS.

- I		,			1 . 1	1 . 1	•	7	۱ ۵	1	Die
N.	0	1	2	8	4	5	6		8	9	Diff.
150	176091 8977	6381 9264	6670 9552	6959 9839	7248	7536	7825	8118	8401	8689	289
2	181844	2129	2415	2700	0126 2985	0413 8270	0699 3555	0986 3839	1272 4123	1558 4407	287 285
. 8	4691	4975	5259	5542	5825	6108	6391	6674	6956	7289	283
.4	7521	7808	8084	8366	8647	8928	9209	9490	9771	0051	281
5	190332	0612	0892	1171	1451	1780	2010	2289	2567	2846	279
6	8125 5900	8408 6176	8681 6453	3959 6729	4287 7005	4514 7281	4792 7556	5069 7832	5846 8107	5623 8382	278 276
8	8657	8982	9206	9481	9755	0029	0808				i
9	201397	1670	1943	2216	2488	2761	3033	0577 8305	0850 3577	1124 3848	274 272
60	4120	4391	4663	4934	5204	5475	5746	6016	6286	6556	271
1 2	6826 9515	7096 9783	7365	7634	7904	8173	8441	8710	8979	9247	269
~ ļ.			0051	0319	0586	0853	1121	1388	1654	1921	267
8	212188 4844	2454 5109	2720 5373	2986 5638	3252 5902	8518 6166	3783 6430	4049 6694	4814 6957	4579 7221	266 264
5	7484	7747	8010	8273	8536	8798	9060	9828	9585	9846	262
6	220108	0870	0681	0892	1158	1414	1675	1986	2196	2456	261
7 8	2716 5809	2976 5568	8236 5826	8496 6084	8755 6842	4015 6600	4274 6858	4533 7115	4792 7372	5051 7680	259 258
9	7887	8144	8400	8657	8913	9170	9426	9682	9938		
1	28				l				<u> </u>	0193	256
				Pro	PORTIO	NAL PA	RTS.				
Diff.	. 1	3	1	3	4	5	6		7	8	9
285 284 283 282 281 280 279 278 277 276	28.5 28.4 28.3 28.2 28.1 28.0 27.9 27.8 27.7 27.6	57.0 56.8 56.6 56.4 56.2 56.0 55.8 55.6 55.4	85 84 84 84 84 88 88 88	.2 .9 .6 .3	114.0 118.6 118.2 112.8 112.4 112.0 111.6 111.2 110.8 110.4	142.5 142.0 141.5 141.0 140.5 140.0 189.5 139.0 138.5	171 170 169 169 168 168 167 166 166	.4 1 .8 1 .2 1 .6 1 .0 1 .4 1 .8 1	99.5 98.8 98.1 97.4 96.7 96.0 95.3 94.6 93.9 98.2	228.0 227.2 226.4 225.6 224.8 224.0 228.2 222.4 221.6 220.8	256. 254. 254. 258. 252. 252. 251. 250. 249. 248.
275	27.5	55.0	82	.5	110.0	137.5	165		92.5	220.0	247.
274 278	27.4 27.8	54.8 54.6	82	.2	109.6 109.2	187.0 186.5	164 168		91.8 91.1	219.2 218.4	246. 245.
272	27.2	54.4	81	.6	108.8	136.0	168	.2 1	90.4	217.6	244
271 270	27.1 27.0	54.2 54.0	81	.8	108.4 108.0	135.5 135.0	162 162		89.7 89.0	216.8 216.0	243 243
269	26.9	53.8	80	.7	107.6	134.5	161	.4 1	88.3	215.2	242
268 267	26.8 26.7	53.6 53.4	80	.4	107.2 106.8	184.0 188.5	160 160	2 1	87.6 86.9	214.4 213.6	241 240
266	26.6	53.2	79	.8	106.4	133.0	159	.6 1	86.2	212.8	239.
265 264	26.5 26.4	53.0 52.8		.5	106.0 105.6	182.5 182.0	159 158		85.5 84.8	212.0 211.2	288. 237.
263	26.8	52.6	78	.9	105.2	181.5	157	.8 1	84.1	210.4	236
262 261	26.2 26.1	52.4 52.2	78	.6 .3	104.8 104.4	181.0 180.5	157 156	.2 1	83.4 82.7	209.6 208.8	235. 234.
260	26.0	52.0	78	.0	104.0	180.0	156	.0 1	82.0	208.0	284.
	25.9	51.8	1 77	.7.	103.6	129.5	155		81.8	207.2	233.
259			i m	, a							
259 258 257	25.8 25.7	51.6 51.4	77	.4 .	108.2 102.8	129.0 128.5	154 154		80.6 79.9	206.4 205.6 204.8	232 231 230

No.	170 L. 23	0.]							[N	o. 189	L. 278
N.	0	1	8		4	5	•	7	8	9	Diff.
170	230449	0704	0960	1215	1470	1724	1979	2234	2488	2742	255
ĭ	2996	8250	8504	3757	4011	4264	4517	4770	5028	5276	253
2	5528	5781	6033	6285	6537	6789	7041	7292	7544	7795	252
3	8046	8297	8548	8799	9049	9299	9550	9800			, ,,,,,,
-						I			0050	0300	250
4	240549	0799	1048	1297	1546	1795	2044	2298	2541	2790	249
5	3038	3286	3534	3782	4030	4277	4525	4772	5019	5266	248
6	5513	5759	6006	6252	6499	6745	6991	7237	7482	7728	246
7	7978	8219	8464	8709	8954	9198	9443	9687	9932		
	!		ļ		!	!				0178	245
8	250430	0664	0908	1151	1395	1638	1881	2125	2868	2610	243
9	2853	3096	8338	3580	3822	4064	4306	4548	4790	5031	242
80	5273	5514	5755	5996	6237	6477	6718	6958	7198	7439	241
1	7679	7918	8158	8398	8637	8877	9116	9355	9594	9888	239
2	260071	0810	0548	0787	1025	1263	1501	1739	1976	2214	238
2	2451	2688	2925	3162	8399	3636	3873	4109	4346	4582	287
4	4818	5054	5290	5525	5761	5996	6232	6467	6702	6987	235
5	7172	7406	7641	7875	8110	8344	8578	8812	9046	9279	234
6	9518	9746	9980								
				0218	0446	0679	0912	1144	1877	1609	233
7	271842	2074	2306	2538	2770	3001	3233	3464	3696	8927	232
8	4158	4389	4620	4850	5081	5311	5542	5772	6008	6232	230
9	6462	6692	6921	7151	7380	7609	7838	8067	8296	8525	229

PROPORTIONAL PARTS.

									
Diff.	1	2	8	4	5	6	7	8	9
255	25.5	51.0	76.5	102.0	127.5	158.0	178.5	204.0	229.5
254	25.4	50.8	76.2	101.6	127.0	152.4	177.8	208.2	228.6
253	25.3	50.6	75.9	101.2	126.5	151.8	177.1	202.4	227.7
252	25.2	50.4	75.6	100.8	126.0	151.2	176.4	201.6	226.8
251	25.1	50.2	75.8	100.4	125.5	150.6	175.7	200.8	225.9
250	25 0	50.0	75.0	100.0	125.0	150.0	175.0	200.0	225.0
249	24.9	49.8	74.7	99.6	124.5	149.4	174.8	199.2	224.1
248	24.8	49.6	74.4	99.2	124.0	148.8	178.6	198.4	228.2
247	24.7	49.4	74.1	98.8	123.5	148.2	172.9 172.8	197.6 196.8	222.3 221.4
246	24.6	49.2	78.8	98.4	123.0	147.6			220.5
245	24.5	49.0	78.5	98.0	122.5	147.0	171.5	196.0	
244	24.4	48.8	73.2	97.6	122.0	146.4	170.8	195.2	219.6
243	24.8	48.6	72.9	97.2	121.5	145.8	170.1	194.4	218.7
242	24.2	48.4	72.6	96.8	121.0	145.2	169.4	193.6	217.8
241	24.1	48.2	72.8	96.4	120.5	144.6	168.7	192.8	216.9
240	24.0	48.0	72.0	96.0	120.0	144.0	168.0	192.0	216.0
239	23.9	47.8	71.7	95.6	119.5	148.4	167.8	191.2	215.1
238	23.8	47.6	71.4	95.2	119.0	142.8	166.6	190.4	214.2
237	23.7	47.4	71.1	94.8	118.5	142.2	165.9	189.6	213.3
236	23.6	47.2	70.8	94.4	118.0	141.6	165.2	188.8	212.4
235	23.5	47.0	70.5	94.0	117.5	141.0	164.5	188.0	211.5
234	28.4	46.8	70.2	93.6	117.0	140.4	163.8	187.2	210.6
233	28.3	46.6	69.9	93.2	116.5	189.8	163.1	186.4	209.7
232	23.2	46.4	69.6	92.8	116.0	139.2	162.4	185.6	208.8
232 231	23.1	46.2	69.3	92.4	115.5	138.6	161.7	184.8	207.9
230	28.0	46.0	69.0	92.0	115.0	138.0	161.0	184.0	207.0
229	22.9	45.8	68.7	91.6	114.5	187.4	160.3	183.2	206.1
228	22.8	45.6	68.4	91.2	114.0	136.8	159.6	182.4	205.2
227	22.7	45.4	68.1	90.8	113.5	136.2	158.9	181.6	204.8
226	22.6	45.2	67.8	90.4	118.0	135.6	158.2	180.8	203.4

TABLE IX.-LOGARITHMS OF NUMBERS.

1 2 3 4 5 5 7 8 9	278754 281033 3301 5557 7802 290035 2256 4466 6665 6665 8853 301030 3196 5351 7496 9630	8982 1261 3527 5782 8026 0257 2478 4687 6884 9071 1247 3412 5566	9211 1488 3753 6007 8249 0480 2699 4907 7104 9289	9439 1715 3979 6232 8473 0702 2920 5127 7323 9507	9667 1942 4205 6456 8696 0925 8141 5847	9895 2169 4431 6681 8920 1147 3363	0123 2.596 4656 6905 9143 1369 3584	7 0351 2622 4882 7130 9366	0578 2849 5107 7354 9589	9 0806 8075 5382 7578 9812 2084	228 227 226 225 223
1 2 3 4 5 6 7 8 9 - 3 000 1 2 8	281033 3301 5557 7802 290035 2256 4466 6665 8853 301030 3196 5351 7496	1261 3527 5782 8026 0257 2478 4687 6884 9071	1488 3753 6007 8249 0480 2609 4907 7104 9289	1715 3979 6233 8473 0702 2920 5127 7828	1942 4205 6456 8696 0925 3141 5847	2169 4431 6681 8920 1147 3363	2596 4656 6905 9143	2622 4882 7130 9366	2849 5107 7354 9589 1813	8075 5382 7578 9812	227 226 225 223
2 3 4 5 6 7 8 9 00 1 2 8	3301 5557 7802 290035 2256 4466 6665 8853 301030 3196 5351 7496	3527 5782 8026 0257 2478 4687 6884 9071	3753 6007 8249 0480 2609 4907 7104 9289	3979 6233 8473 0702 2920 5127 7323	4205 6456 8696 0925 8141 5847	2169 4431 6681 8920 1147 3363	2596 4656 6905 9143	2622 4882 7130 9366	2849 5107 7354 9589 1813	8075 5382 7578 9812	227 226 225 223
2 3 4 5 6 7 8 9 00 1 2 8	3301 5557 7802 290035 2256 4466 6665 8853 301030 3196 5351 7496	3527 5782 8026 0257 2478 4687 6884 9071	3753 6007 8249 0480 2609 4907 7104 9289	3979 6233 8473 0702 2920 5127 7323	4205 6456 8696 0925 8141 5847	4431 6681 8920 1147 8863	4656 6905 9143 1369	4882 7130 9366 1591	5107 7354 9589 1813	5332 7578 9812	226 225 223
3 4 5 5 7 8 9 5 000 1 2 8	5557 7802 290035 2256 4466 6665 8853 301030 3196 5351 7496	5782 8026 0257 2478 4687 6884 9071	0480 2699 4907 7104 9289	6233 8473 0702 2920 5127 7323	6456 8696 0925 8141 5847	6681 8920 1147 8363	6905 9143 1369	7130 9366 1591	7354 9589 1818	7578 9812	223
5 6 7 8 9 - 000 1 2 8	290035 2256 4466 6665 8853 301030 3196 5351 7496	0257 2478 4687 6884 9071 1247 3412	0480 2699 4907 7104 9289	0702 2920 5127 7828	0925 8141 5847	1147 3363	1369	1591	1813		
6 7 8 9 000 1 2 3	2256 4466 6665 8853 301030 3196 5351 7496	2478 4687 6884 9071 1247 3412	2699 4907 7104 9289	2920 5127 7323	8141 5847	3363		1591		2034	
7 8 9 00 1 2 3	4466 6665 8853 301030 3196 5351 7496	4687 6884 9071 1247 3412	4907 7104 9289 1464	5127 7323	5847		Q5Q4				222
8 9 000 1 2 3	8665 8853 301030 3196 5351 7496	6884 9071 1247 3412	7104 9289 1464	7823			5787	3804 6007	4025 6226	4246 6446	221 220
9 00 1 2 8	301030 3196 5351 7496	9071 1247 3412	9289	9507	7542	5567 7761	7979	8198	8416	8685	219
1 2 8	8196 5351 7496	3412			9725	9943		0000	0595	0818	218
1 2 8	8196 5351 7496	3412		1681	1898	2114	0161 2331	2547	2764	2980	217
2	5351 7496		3628	3844	4059	4275	4491	4706	4921	5136	216
			5781	5996	6211	6425	6639	6854	7068	7282	215
• 1		7710 9843	7924	8137	8351	8564	8778	8991	9204	9417	213
. I			0056	0268	0481	0693	0906	1118	1330	1542	212
5 8	811754 8867	1966 4078	2177 4289	2389 4499	2600 4710	2812 4920	3023 5130	8284 5840	8445 5551	8656 5760	211 210
7	5970	6180	6390	6599	6809	7018	7227	7486	7646	7854	209
8	8063	8272	8481	8689	8898	9106	9314	9522	9730	9938	208
9 8	820146	0354	0562	0769	0977	1184	1391	1598	1805	2012	207
10	2219	2426	2633	2839	8046	3252	8458	8665	3871	4077	206
2	4282 6336	4488 6541	4694	4899 6950	5105	5310 7359	5516 7563	5721 7767	5926 7972	6131 8176	205 204
3	8380	8583	6745 8787	8991	7155 9194	9898	9601	9805	<u> </u>	-	
4 8	330414	0617	0819	1022	1225	1427	1630	1832	0008 2034	0211 2286	203
				P	ROPORT	IONAL :	Parts.				
Diff.	1	2	8	3	4	5	6		7	8	9
225	22.5	45.0	67	_	90.0	112.5	135	0 1	57.5	180.0	202.
224	22.4	44.8	67		89.6	112.0	134	4 1	56.8	179.2	201.
223	22.3	44.6	66		89.2	111.5	133		56.1	178.4	200.
222 221	22.2 22.1	44.4 44.2	66		88.8 88.4	111.0 110.5	133		55.4	177.6 176.8	199. 198.
220	22.0	44.0	66	.0	88.0	110.0	132	.0 1	54.0	176.0	198.
219 218	21.9 21.8	43.8 43.6	65 65		87.6 87.2	109.5 109.0	131	4 1	58.8 52.6	175.2 174.4	197. 196.
217	21.7	43.4	65		86.8	108.5	130		51.9	178.6	195.
216	21.6	43.2	64		86.4	108.0	129	6 1	51.2	172.8	194.
215 214	21.5 21.4	43.0 42.8	64 64		86.0 85.6	107.5 107.0	129 128		50.5 19.8	172.0 171.2	193. 192.
213	21.3	42.6	63		85.2	106.5	127		19.1	170.4	191.
212	21.2	42.4	63	.6	84.8	106.0	127	.2 14	18.4	169.6	190.
211 210	21.1 21.0	42.2 42.0	63 63		84.4 84.0	105.5 105.0	126 126		17.7 17.0	168.8 168.0	189. 189.
209	20.9	41.8	1		83.6	104.3	125		16.3	167.2	188.
208	20.8	41.6	62	.4	83.2	104.0	124	8 1	15.6	166 4	187.
207	20.7	41.4	62		82.8	103.5	124	.2 14	14.9	165.6	186.
206 205	20.6 20.5	41.2 41.0			82.4 82.0	108.0 102.5	123 123	0 1	14.2 13.5	164.8 164.0	185. 184.
204	20.4	40.8	61		81.6	102.0	122	.4 1	12.8	163.2	183.
203 202	20.3 20.2	40.6 40.4	60	.9	81.2	101.5	121		12.1 11.4	162.4 161.6	182.

N.	0	1	2	8	4	5	6	7	8	9	Diff.
15	832438	2640	2842	3044		3417	8649	3850	4051	4258	202
6	4454	4655	4856	5067		5458	5658	5859	6059	6260	201
8	6460 845 6	6660 8656	6860 8855	7060 9054		7459 9451	7659 9650	7858 9849	8058	8257	200
9	840444	0642	0841	1039	1237	1435	1632	1830	0047 2028	0246 2225	199 198
20	2423	2620	2817	8014		8409	3606	8802	8999	4196	197
1	4392 6353	4589 6549	4785	4981 6989		5374	5570 7525	5766	5962	6157	196
8	8305	8500	6744 8694	8886		7830 9278	9472	7720 9666	7915 9860	8110	195
4	350248	0442	0636	0829	1023	1216	1410	1603	1796	- 0054 1989	194 198
5	2188	2375	2568	2761	2954	8147	3339	3532	8724	8916	198
6	4108	4301	4493	468	4876	5068	5260	5452	5643	5834	192
7 8	6026 7985	6217 8125	6408 · 8316	6599 8506		6981 8886	7172 9076	7363 9266	7554 9456	7744 9646	191 190
9	9835				_					-	
30	361728	0025 1917	0215 2105	2294		0783 2671	0972 2859	1161 3048	1350 8236	1539 8424	189 188
1	8612	3800	3988	4176		4551	4789	4926	5113	5801	188
2	5488	5675	5862	6049	6236	6423	6610	6796	6983	7169	187
8	7356 9216	7542 9401	7729 9587	7915 9775		8287	8473	8659	8845	9080	186
- -						0143	0328	0518	0698	0888	185
5	871068 2912	1253 8096	1437 8280	1625 8464		1991 8831	2175 4015	2360 4198	2544 4382	2728 4565	184 184
7	4748	4932	5115	5296	3 5481	5664	584 6	6029	6212	6394	183
8	6577	6759	6942	7124		7488	7670	7852	8084	8216	182
9	8398 8 8	8580	8761	894	8 9124	9306	9487	9668	9849		1
	·	!	·	·	<u> </u>	1				0080	181
	1	 I	·		BOPORTIO		1				
Diff.	1	2		Pa	oportio	onal Pa	ARTS.		7	8	9
Diff.	20.2	40.4	60	B .6	80.8	5	6	.2 1	41.4	8	9 181.8
	20.2 20.1	40.4	60	В	.4	5	6	.6 1 .0 1	41.4 40.7 40.0	8 161.6 160.8 160.0	9 181.4 180.5
202 201 200 199	20.2 20.1 20.0 19.9	40.4 40.2 40.0 39.8	60 60 60 59	B .6 .8 .0 .7	80.8 80.4 80.0 79.6	5 101.0 100.5 100.0 99.5	121 120 120 119	.6 1 .0 1 .4 1	41.4 40.7 40.0 39.3	8 161.6 160.8 160.0 159.2	9 181.4 180.5 180.6 179.
202 201 200 199 198	20.2 20.1 20.0 19.9 19.8	40.4 40.2 40.0 39.8 39.6	60 60 59 59	8 .6 .8 .0 .7	80.8 80.4 80.0 79.6 79.2	5 101.0 100.5 100.0 99.5 99.0	121 120 120 120 119 118	.6 1 .0 1 .4 1 .8 1	41.4 40.7 40.0 39.3 38.6	8 161.6 160.8 160.0 159.2 158.4	181.1 180.1 180.1 179.1 178.1
202 201 200 199	20.2 20.1 20.0 19.9 19.8 19.7 19.6	40.4 40.2 40.0 39.8	60 60 60 59 59	8 .6 .8 .0 .7 .4	80.8 80.4 80.0 79.6 79.2 78.8	5 101.0 100.5 100.0 99.5	121 120 120 119	.6 1 .0 1 .4 1 .8 1 .2 1	41.4 40.7 40.0 39.3 38.6 37.9 37.2	8 161.6 160.8 160.0 159.2	181.1 180.1 179.1 178.1
202 201 200 199 198 197 196 195	20.2 20.1 20.0 19.9 19.8 19.7 19.6 19.5	40.4 40.2 40.0 39.8 39.6 39.4 39.2 39.0	60 60 59 59 59 58	8 .8 .0 .7 .4 .1	80.8 80.4 80.0 79.6 79.2 78.8 78.4 78.0	5 101.0 100.5 100.0 99.5 99.0 98.5 98.0 97.5	121 120 120 120 119 118 118 117 117	.6 1 .4 1 .8 1 .2 1 .6 1	41.4 40.7 40.0 39.3 38.6 37.9 37.2 36.5	8 161.6 160.8 160.0 159.2 158.4 157.6 156.8	9 181.1 180.1 180.1 177.1 176.1 175.1
202 201 200 199 198 197 196 195 194	20.2 20.1 20.0 19.9 19.8 19.7 19.6	40.4 40.2 40.0 39.8 39.6 39.4 39.2	60 60 60 59 59 59 58 58	8 .6 .8 .0 .7 .4 .1 .8 .5	80.8 80.4 80.0 79.6 79.2 78.8 78.4 78.0 77.6	5 101.0 100.5 100.0 99.0 98.5 98.0	121 120 120 120 119 118 118 117	.6 1 .4 1 .8 1 .8 1 .6 1 .0 1	41.4 40.7 40.0 39.3 38.6 37.9 37.2	8 161.6 160.8 160.0 159.2 158.4 157.6 156.8 156.8 156.2	181.4 180.1 180.1 179.1 176.1 176.1 174.1
202 201 200 199 198 197 196 195 194 193 192	20.2 20.1 20.0 19.9 19.8 19.7 19.6 19.5 19.4 19.3	40.4 40.2 40.0 39.8 39.6 39.4 39.2 39.0 38.8 38.6	60 60 60 59 59 58 58 58 58	8 .6 .8 .0 .7 .4 .1 .8 .5 .2	80.8 80.4 80.0 79.6 79.2 78.8 78.4 78.0 77.6 77.2	101.0 100.5 100.0 99.5 99.0 98.5 98.0 97.5 97.5 96.5	121 120 120 120 119 118 118 117 116 115	.6 1 .4 1 .8 1 .8 1 .9 1 .6 1 .6 1 .4 1	41.4 40.7 40.0 39.3 38.6 37.9 37.2 36.5 35.8 35.1	8 161.6 160.8 160.0 159.2 158.4 157.6 156.8 156.0 155.2 154.4 158.6	181.1 180.1 179.1 177.1 176.1 176.1 174.1 173.1
202 201 200 199 198 197 196 195 194 193 192 191	20.2 20.1 20.0 19.9 19.8 19.7 19.6 19.5 19.4 19.3 19.2	40.4 40.2 40.0 39.8 39.6 39.4 39.2 39.0 38.8 38.6 38.4	60 60 59 59 59 58 58 58 58 57 57	8 .6 .8 .0 .7 .4 .8 .5 .2 .9	80.8 80.4 80.0 79.6 79.2 78.4 78.0 77.6 77.8 76.8 76.4	101.0 100.5 100.0 99.5 99.0 98.5 96.0 97.5 96.5 96.5	121 120 120 120 119 118 118 117 117 116 115 115	.6 1 .0 1 .4 1 .8 1 .2 1 .6 1 .4 1 .8 1 .8 1	41.4 40.7 40.0 38.6 37.9 37.2 36.5 35.8 35.1 34.4 33.7	8 161.6 160.8 160.0 159.2 158.4 157.6 156.0 155.2 154.4 158.8	181.4 180.1 179.1 178.1 176.1 174.1 173.1 172.1
202 201 200 199 198 197 196 195 194 193 192 191	20.2 20.1 20.0 19.9 19.8 19.7 19.6 19.5 19.4 19.3	40.4 40.2 40.0 39.8 39.6 39.4 39.2 39.0 38.8 38.6 38.4 38.2 38.3	60 60 60 59 59 58 58 58 58 57 57	8 .6 .8 .0 .7 .4 .1 .8 .5 .2 .9 .6 .3	80.8 80.4 80.0 79.6 79.2 78.8 78.4 78.0 77.6 77.2	101.0 100.5 100.0 99.5 99.0 98.5 98.0 97.5 97.5 96.5	121 120 120 120 119 118 118 117 116 115	.6 1 .0 1 .4 1 .8 1 .8 1 .6 1 .4 1 .8 1	41.4 40.7 40.0 39.3 38.6 37.9 37.2 36.5 35.8 35.1	8 161.6 160.0 159.2 158.4 157.6 156.8 156.0 155.2 154.4 153.6 152.8	181.180.180.179.176.176.177.176.177.177.177.177.1771.1771.1771.1771.1771.1771.1771.1771.1771.1771.1771.1770.
202 201 200 199 198 197 196 195 194 193 192 191 190 189 188	20.2 20.1 20.0 19.9 19.8 19.7 19.5 19.4 19.3 19.2 19.1 19.0 18.9 18.8	40.4 40.2 40.0 39.8 39.6 39.4 39.2 39.0 38.8 38.6 38.4 38.2 38.0 37.6	59 59 59 58 58 58 57 57 57 57	8 .6 .8 .7 .4 .1 .8 .5 .2 .9 .6 .3 .0 .7 .4	80.8 80.4 80.0 79.2 78.8 78.0 77.6 77.2 76.4 76.0 75.2	5 101.0 100.0 99.5 99.0 98.5 97.0 96.5 96.0 95.5 95.0 94.0	121 120 120 119 118 118 117 116 115 114 114 114 114 1118	.6 1 .0 1 .8 1 .2 1 .6 1 .6 1 .8 1 .8 1 .8 1 .8 1	41.4 40.7 40.7 39.3 38.6 37.9 37.2 36.5 35.8 35.1 34.4 33.7 33.0 33.3 31.6	8 161.6 160.0 159.2 158.4 157.6 156.8 156.0 155.3 154.4 153.6 152.8 152.0 151.2	181.8 180.1 180.1 179.1 178.1 177.1 174.1 173.1 171.1 171.1 170.1
202 201 200 199 198 197 196 195 194 193 192 191 190 189	20.2 20.1 20.0 19.9 19.8 19.5 19.5 19.4 19.3 19.2 19.1 19.0 18.9	40.4 40.2 40.0 39.8 39.6 39.4 39.2 39.0 38.8 38.6 38.4 38.2 38.0 37.8	59 59 59 58 58 58 57 57 57 57 57	8 .6 .8 .7 .4 .1 .8 .5 .2 .9 .6 .3 .0 .7 .4	80.8 80.4 80.0 79.6 79.2 78.8 78.0 77.6 76.8 76.4 76.5	5 101.0 100.0 99.5 99.0 98.5 98.0 97.5 97.0 96.5 95.5 95.0 94.5	121 120 120 119 118 118 117 116 115 115 114 114 1113	.6 1 .0 1 .4 1 .8 1 .2 1 .6 1 .6 1 .6 1 .6 1 .6 1 .8 1 .8 1 .8 1	41.4 40.7 40.7 39.3 38.6 37.9 37.2 36.5 35.8 35.1 34.4 33.7 33.0 32.3	8 161.6 160.8 160.0 159.2 158.4 157.6 156.8 156.0 155.2 154.4 152.8 152.8 152.8	181.6 180.1 170.1 178.1 177.1 176.1 173.1 172.1 171.1 170.1 169.1
202 201 200 199 198 197 196 195 194 193 199 199 189 188 187 186 185	20.2 20.1 20.0 19.9 19.8 19.7 19.6 19.5 19.4 19.3 19.2 19.1 18.8 18.7 18.6	40.4 40.2 40.0 39.8 39.6 39.6 39.2 39.0 38.8 38.4 38.2 38.0 37.8 37.6 37.6 37.6	59 59 59 58 58 58 58 57 57 57 57 57 58 58 58	3.6 3.0 3.0 3.1 3.1 3.2 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	80.8 80.4 80.0 79.6 79.8 78.4 77.6 77.2 76.8 76.4 76.0 75.6 74.8 74.0	5 101.0 100.5 100.0 99.0 98.5 97.0 96.5 96.0 95.5 94.0 93.5 93.0 92.5	121 120 120 119 118 118 117 116 115 114 114 113 112 112 111	.6 1 .0 1 .4 1 .8 1 .8 1 .6 1 .6 1 .6 1 .8 1 .8 1 .8 1 .8 1 .8 1 .8 1 .8 1 .8 1 .8 1 .9 1 .9	41.4 40.7 40.0 39.3 387.9 37.2 36.5 35.8 35.1 33.7 33.7 33.0 32.3 31.6 30.9 30.2	8 161.6 160.8 160.0 159.2 158.4 156.8 156.0 155.2 154.4 153.6 152.0 151.2 150.4 149.6 148.0	9 181.1 180.1 179.1 176.1 173.1 174.1 173.1 171.1 171.1 169.1 168.1
202 201 200 199 198 197 196 195 194 193 199 199 189 188 187 186 185	20.2 20.1 20.0 19.9 19.8 19.7 19.6 19.5 19.4 19.3 19.2 19.1 19.0 18.8 18.7 18.6	40.4 40.2 40.0 39.8 39.6 39.4 39.2 39.0 38.8 38.6 38.4 38.2 38.0 37.6 37.6 37.6 37.8	59 59 59 58 58 58 58 57 57 57 57 57 57 57 57 57 57 57 57 57	8 .6 .3 .07 .4 .1 .1 .82 .9 .6 .3 .07 .4 .1 .1 .83	80.8 80.8 80.0 79.6 79.6 77.8 8 78.0 77.6 76.8 76.4 76.4 76.4 76.4 77.6 77.6 77.8 74.8 74.4 74.0	5 101.0 100.5 100.0 99.5 99.0 98.5 97.0 96.5 96.0 95.5 94.0 94.5 94.0 93.5 93.0	121 120 120 120 118 118 117 116 115 114 114 114 1112 1112 1111	.6 1 .6 1 .8 1 .2 1 .6 1 .4 1 .8 1 .8	41.4 40.7 40.0 339.6 37.9 37.2 36.5 35.1 34.4 333.7 332.3 31.6 30.9 32.3 32.3 32.3	8 161.6 160.8 160.0 159.2 158.4 157.6 156.8 156.9 155.2 159.4 149.6 152.0 148.8 148.8 148.0 147.2	181.1 180.1 179.1 177.1 176.1 177.1 171.1 171.1 171.1 168.1 167.1 168.1 167.1
202 201 200 199 198 197 196 195 194 193 192 191 190 188 187 186 185 184 188	20.2 20.1 20.0 19.9 19.8 19.5 19.5 19.1 19.2 19.1 18.8 18.7 18.6 18.5 18.4	40.4 40.2 40.0 39.6 39.6 39.2 39.0 38.8 38.4 38.2 38.0 37.8 37.8 37.8 37.8 37.8 37.8 37.8	60 60 59 59 58 58 58 58 57 57 57 57 57 57 57 57 57 57 57 57 57	3.6 3.0 3.0 3.7 3.4 3.5 3.6 3.0 3.7 4.1 3.8 3.8 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	80.8 80.4 80.0 79.6 79.8 78.4 77.6 77.2 76.4 76.6 75.6 75.2 74.4 74.0 73.6 73.2	5 101.0 100.5 100.0 99.0 98.5 97.0 96.5 96.0 95.5 94.0 93.5 93.0 92.5	121 120 120 119 118 118 117 117 116 115 114 114 113 112 111 111 111 110	.6 1 .4 1 .8 1 .8 1 .6 1 .8 1 .8	41.4 40.7 40.0 39.3 38.6 37.9 37.2 36.5 33.7 33.3 33.3 31.6 30.9 30.9 29.5 28.1	8 161.6 160.8 160.0 159.2 158.4 157.6 156.8 156.3 154.4 153.6 152.0 152.0 154.4 149.6 148.8 148.0 147.2 148.1	181.6 180.1 180.1 179.1 177.5 177.6 173.1 174.1 173.1 171.1 168.3 167.1 168.1 165.1 165.1 165.1
202 201 200 199 198 197 196 195 194 193 192 191 190 188 187 186 185 184	20.2 20.1 20.0 19.9 19.8 19.7 19.6 19.5 19.4 19.3 19.2 19.1 19.0 18.8 18.7 18.6	40.4 40.2 40.0 39.8 39.6 39.4 39.2 39.0 38.8 38.6 38.4 38.2 38.0 37.6 37.6 37.6 37.8	60 60 59 59 58 58 58 58 57 57 57 57 57 57 57 57 57 57 57 57 57	8 .6 .6	80.8 80.8 80.0 79.6 79.6 77.8 8 78.0 77.6 76.8 76.4 76.4 76.4 76.4 77.6 77.6 77.8 74.8 74.4 74.0	5 101.0 100.5 100.0 99.0 98.5 98.0 97.5 96.0 95.5 95.0 94.5 95.0 94.0 93.5 93.0 92.5 93.0 92.5	121 120 120 120 118 118 117 116 115 114 114 114 1112 1112 1111	6 1 0 1 1.8 1 1.8 1 1.6 1 1.4 1 1.8 1 1.6 1 1.6 1 1.8 1	41.4 40.7 40.0 339.6 37.9 37.2 36.5 35.1 34.4 333.7 332.3 31.6 30.9 32.3 32.3 32.3	8 161.6 160.8 160.0 159.2 158.4 157.6 156.8 156.9 155.2 159.4 149.6 152.0 148.8 148.8 148.0 147.2	9 181.1 180.1 179.1 177.1 173.1 173.1 171.1 171.1 168.1 166.1 164.1

No.	240 L. 38	0.]							ĹN	o, 269]	L. 481.
N.	0	1	2	8	4	5	6	7	8	9	Diff.
240	380211	0392	0573	0754	0934	1115	1296	1476	1656	1837	181
ĭi	2017	2197	2377	2557	2737	2917	3097	3277	3456	8636	180
2	3815	3995	4174	4353	4533	4712	4891	5070	5249	5428	179
8	5606	5785	5964	6142	4533 6321	6499	6677	6856	7034	7212	178
4	7390	7568	7746	7924	8101	8279	8456	8634	8811	8989	178
5	9166	9343	9520	9698	9875	 					1
					<u>'</u>	0051	0228	0405	0582	0759	177
6	390935	1112	1288	1464	1641	1817	1993	2169	2345	2521	176
7	2697	2873	8048	3224	8400	3575	8751	8926	4101	4277	176
8	4452	4627	4802	4977	5152	5326	5501	5676	5850	6025	175
9	6199	6374	6548	6722	6896	7071	7245	7419	7592	7766	174
250 1	7940 9674	8114 9847	8287	8461	8634	8808	8981	9154	9328	9501	173
-			0020	0192	0365	0538	0711	0883	1056	1228	173
2	401401	1578	1745	1917	2089	2261	2433	2605	2777	2949	172
3	3121	3292	8464	3635	.3807	3978	4149	4320	4492	4663	171 171
4	4834	5005	5176	5346	5517	5688	5858	6029	6199	6370	171
5	6540	6710	6881	7051	7221	7391	7561	7731	7901	8070	170
6	8240	8410	8579	8749	8918	9087	9257	9426	9595	9764	169
7	9938								·		
		0102	0271	0440	0609	0777	0046	1114	1283	1451	169
8	411620	1788	1956	2124	2293	2461	2629	2796	2964	8132	168
9	8300	3467	3635	3803	8970	4137	4305	4472	4639	4806	167
260	4973	5140	5307	5474	5641	5808	5974	6141	6308	6474	167
1	6641	6807	6973	7139	7306	7472	7638	7804	7970	8135	166
2	8301	8467	8633	8798	8964	9129	9295	9460	9625	9791	165
8	9956					!			\ 		
		0121	0286	0451	0616	0781	0945	1110	1275	1439	165
4	421604	1768	1933	2097	2261	2426	2590	2754	2918	8082	164
5	3246	3410	8574	8737	8901	4065	4228	4392	4555	4718	164
6	4882	5045	5208	5371	5534	5697	5860	6023	6186	6349	163
7	6511	6674	6836	6999	7161	7324	7486	7648	7811	7978	162
8	8135	8297	8459	8621	8783	8944	9106	9268	9429	9591	162
9	9752	9914	0000	0236	0398	OFFO	07000	0001	1040	1200	101
	43		0075	1 0236	USYS	0559	0720	0681	1043	1208	161

PROPORTIONAL PARTS.

Diff.	1	2	8	4	5	6	7	8	9
178 177 176 175 174 173 173	17.8 17.7 17.6 17.5 17.4 17.3 17.2	35.6 35.4 85.2 85.0 34.8 34.6	53.4 53.1 52.8 52.5 52.2 51.9	71.2 70.8 70.4 70.0 69.6 69.2 68.8 68.4	89.0 88.5 88.0 87.5 87.0 86.5 86.0 85.5	106.8 106.2 105.6 105.0 104.4 103.8 103.2 102.6	124.6 123.9 123.2 122.5 121.8 121.1 120.4	142.4 141.6 140.8 140.0 189.2 138.4 137.6 186.8	160.2 159.3 158.4 157.5 156.6 155.7 154.8
171 170 169	17.1 17.0 16.9	34.2 34.0 33.8	51.8 51.0 50.7	68.0 67.6	85.0 84.5	102.0 102.0 101.4	119.7 119.0 118.3	186.0 185.2	153.9 153.0 152.1
168 167 166 165 164 163 162	16.8 16.7 16.6 16.5 16.4 16.3 16.2	83.6 33.4 83.2 83.0 82.8 32.6	50.4 50.1 49.8 49.5 49.2 48.9 48.5	67.2 66.8 66.4 66.0 65.6 65.2 64.8	84.0 83.5 83.0 82.5 82.0 81.5 81.0	100.8 100.2 99.6 99.0 98.4 97.8 97.2	117.6 116.9 116.2 115.5 114.8 114.1	134.4 133.6 132.8 132.0 131.2 130.4 129.6	151.2 150.3 149.4 148.5 147.6 146.7 145.8
161	16.1	82.2	48.8	64.4	80.5	96.6	112.7	128.8	144.9

N.											
	0	1	2	8	4	5	6	7	8	•	Diff.
70	431364	1525	1685	1846	2007	2167	2328	2488	2649	2809	161
Ϊl	2969	8130	8290	8450	8610	8770	8930	4090	4249	4409	160
2	4569	4729	4888	5048	5207	5367	5526	5685	5844	6004	159
8	6168	6322	6481	6640	6799	6957	7116	7275	7488	7502	159
4 5	7751 9333	7909 9491	9067 9648	8226 9806	8384 9964	8542	8701	8859	9017	9175	. 158
٥	8000	9491	9040	8000	8804	0122	0279	0487	0594	0752	158
6	440909	1066	1224	1381	1538	1695	1852	2009	2166	2323	157
7	2480	2637 4201	2798	2950	8106	3263	3419	8576	8732	3889	157
8	4045	4201	4357	4513	4669	4825	4981	5187	5298	5449	156
9	5604	5760	5915	6071	6226	6382	6587	6692	6848	7003	155
180	7158 8706	7318 8861	7468 9015	7628 9170	7778 9324	7933 9478	9088 9633	8242 9787	8397 9941	8552	155
					0005		1100	1826	1.000	0095	154
2	450249	0408	0557 2098	0711	0865 2400	1018	1172 2706	2859	1479 8012	1633	154 158
8	178 6 8818	1940 8471	8624	2247 8777	3930	2553 4082	4235	4387	4540	8165 4692	158
5	4845	4997	5150	5302	5454	5606	5758	5910	6062	6214	152
6	6366	6518	6670	6821	6978	7125	7276	7428	7579	7731	152
7	7882	8033	8184	8336	8487	8638	8789	8940	9091	9243	151
8	9392	9548	9694	9845	9995	0146	0296	0447	0597	0748	151
9	460898	1048	1198	1348	1499	1649	1799	1948	2098	2248	150
90	2398	2548	2697	2847	2997	8146	8296	8445	8594	8744	150
1	3893	4042	4191	4840	4490	4639	4788	4936	5085	5234	149
28	5383	5533	5680	5829	5977	6126	6274	6428	6571	6719	149
4	6868	7016 8495	7164 8648	7312 8790	7460 8938	7608 9085	9233	7904 9380	- 8052 9527	8200 9675	148 148
5	9822	9969	6040	0190	0000	3000	8200	8000	8021	8013	140
-			0116	0268	0410	0557	0704	0851	0998	1145	147
6	471292	1438	1585 3049	1732 3195	1878 8341	2025 3487	2171	2318	2464 8925	2610	146
7 8	2756 4216	2903 4362	4508	4658	4799	4944	3633 5000	8779 5235	5881	4071 5526	146
ŝ	5671	5816	5962	6107	6252	6397	6542	6687	6832	6976	145
		'		Pro	PORTIC	NAL P.	ARTS.		!	<u> </u>	<u></u>
Diff	ř. 1	2	1	3	.4	5	6		7	8	9
161	16.1	32.2	48	.8	64.4	80.5	96.0	B 1:	12.7	128.8	144.
160	16.0	82.0	48	.0	64.0	80.0	96.0	0 1:	12.0	128.0	144.
159		81.8			63.6	79.5	95.4		11.8	127.2 126.4	143. 142.
158	15.8 15.7	31.6			63.2 62.8	79.0 78.5	94.8		10.6 09.9	125.6	141.
157 156		81.4 81.2	46		62.4	78.0	93.0		09.2	124.8	140.
155	15.5	81.0			62.0	77.5	93.0		8.5	124.0	189
154	15.4	80.8			61.6	77.0	92.4	1 1	7.8	123.2	188.
153		80.6	45		61.2	76.5	91.8	8 1	07.1	122.4	187.
	15.2	80.4			60.8	76.0	91.5	2 10	06.4	121.6	136.
152		80.2		.8	60.4	75.5	90.0		05.7	120.8	185.
151		80.0		.0	60.0	75.0	90.0	1 19	05.0	120.0	135
151 150				.7	59.6	74.5	89.4	1 1	04.8	119.2	184.
151 150 149	14.9	29.8									1 199
151 150 149 148	14.9 14.8	29.8 29.6	44	.4	59.2	74.0 73.5	99	9 1	08.6	118.4 117.6	
151 150 149 148 147	14.9 14.8 14.7	29.8 29.6 29.4	44	.4	58.8	73.5	88.9	2 10	02.9	117.6	182
151 150 149 148 147 146	14.9 14.8 14.7 14.6	29.8 29.6 29.4 29.2	44 44 43	.4 .1 .8	58.8 58.4	73.5 73.0	88.5 87.0	8 10	02.9	117.6 116.8	182 181
151 150 149 148 147	14.9 14.8 14.7 14.6 14.5	29.8 29.6 29.4	44 44 43 43	.4	58.8	73.5	88.9 87.0 87.0	8 10 8 10 0 10 4 10	02.9 02.2 01.5 00.8	117.6 116.8 116.0 115.2	182 181 180 129
151 150 149 148 147 146 145 144 143	14.9 14.8 14.7 14.6 14.5 14.4 14.8	29.8 29.6 29.4 29.2 29.0 28.8 28.6	44 44 43 43 43 42	.4 .1 .8 .5 .2	58.8 58.4 58.0 57.6 57.2	73.5 73.0 72.5 72.0 71.5	88.5 87.0 87.0 86.4 85.8	8 10 8 10 0 10 4 10 8 10	02.9 02.2 01.5 00.8 00.1	117.6 116.8 116.0 115.2 114.4	182 181 180 129 128
151 150 149 148 147 146 145 144	14.9 14.8 14.7 14.6 14.5 14.4 14.8	29.8 29.6 29.4 29.2 29.0 28.8	44 43 43 43 43 42 42	.4 .1 .8 .5 .2 .9	58.8 58.4 58.0 57.6	73.5 73.0 72.5 72.0	88.9 87.0 87.0	2 10 8 10 0 10 4 10 8 10	02.9 02.2 01.5 00.8	117.6 116.8 116.0 115.2	183. 182. 181. 180. 129. 128. 127.

No. 8	300 L. 47	7.]							(N	o. 339 1	L. 531.
N.	0	1	2	8	4	5	6	7	8	9	Diff.
300	477121	7266	7411	7555	7700	7844	7989	8133	8278	8422	145
1	8566	8711	8855	8999	9143	9287	9431	9575	9719	9863	144
2	480007	0151	0294	0438	0582	0725	0869	1012	1156	1299	144
3 4	1443	1586	1729 3159	1872	2016	2159 3587	2302 3730	2445 3872	2588 4015	2781	143
5	2874 4300	3016 4442	4585	3302 4727	3445 4869	5011	5153	5295	5437	4157 5579	143 142
6	5721	5863	6005	6147	6289	6430	6572	6714	6855	6997	142
7	7138	7280	7421	7563	7704	7845	7986	8127	8269	8410	141
8	8551 9958	8692	8833	8974		9255	9396	9537	9677	9818	141
		0099	0239	0380		0661	0801	0941	1081	1222	140
310	491362	1502	1642	1782		2062	2201	2341	2481	2621	140
1 2	2760 4155	2900 4294	3040 4433	8179 4572	8319 4711	8458 4850	8597 4989	3737 5128	8876 5267	4015 5406	139 139
3	5544	5683	5822	5960		6238	6376	6515	6653	6791	189
4	6930	7068	7206	7344		7621	7759	7897	8035	8178	138
5	8311 9687	8448 9824	8586 9962	8724		8999	9137	9275	9412	9550	188
				0099		0374	0511	0648	0785	0922	137
7	501059	1196	1333	1470		1744	1880	2017	2154	2291	137
8	2427 3791	2564 3927	2700 4063	2837 4199		3109 4471	8246 4607	8882 4743	8518 4878	3655 5014	136 136
320	5150	5286	5421	5557		5828	5964	6099	6234	6370	186
1	6505	6640	6776	6911		7181	7316	7451	7586	7721	185
2	7856	7991	8126	8260		8530	8664	8799	8934	9068	185
8	9203	9337	9471	9606	9740	9874	0009	0143	0277	0411	134
4	510545	0679	0813	0947	1081	1215	1849	1482	1616	1750	184
5	1888	2017	2151	2284		2551	2684	2818	2951	3084	133
6	3218	8351	3484	3617		3883	4016	4149	4282		133
8	4548 5874	4681 6006	4813 6139	4946 6271		5211 6535	5344 6668	5476 6800	5609 6932		133 132
9	7196	7328	7460	7592		7855	7987	8119	8251		182
830	8514	8646	8777	8909	9040	9171	9303	9434	9566	9697	181
1	9828	9959	0090	0221	0353	0484	0615	0745	0876	1007	131
2	521138	1269	1400	1530		1792	1923	2053	2188	2314	181
3	2444	2575	2705	283	2966	8096	3226	8356	3486	3616	130
4	8746	3876	4006	4136		4396	4526	4656	4785	4915	180
5 6	5045 6339	5174 6469	5304 6598	5434		5693 6985	5822 7114	5951	6081 7372	6210 7501	129 129
7	7630	7759	7888	6727 8010		8274	8402	7243 8531	8660	8788	129
8	8917	9045	9174	930		9559	9687	9815	9948	 	
9	580200	0328	0456	058	0712	0840	0968	1696	1223	- 0072 1851	128 128
				PR	OPORTIO	NAL PA	RTS.				
Diff	. 1	2	T :	B	4	5	6		7	8	9
139	18.9	27.8	41	.7	55.6	69.5	83.	4 -	7.8	111.2	125.
138	13.8	27.6	41	.4	55.2	69.0	82.	8 9	6.6	110.4	124.
137	13.7	27.4			54.8	68.5	82.		5.9	109.6	123.
136	13.6	27.2		.8	54.4	68.0 67.5	81.		5.2 4.5	108.8 108.0	122. 121.
185 184	13.5 13.4	27.0 26.8	40	.5	54.0 53.6	67.0	80.		3.8	107.2	120.
133	13.8	26.6		.9	53.2	66.5	79.		3.1	106.4	119.
132	13.2	26.4	89	.6	52.8	66.0	79.	2 9	2.4	105.6	118.
131	13.1	26.2	89	.3	52.4	65.5	78.	6 9	1.7	104.8	117.
130	18.0	26.0		.0	52.0	65.0	78.		1.0	104.0	117.
129 128	12.9	25.8 25.6	38	.4	51.6	64.5	77.	4 9	0.3	103.2 102.4	116.
140	12.8	25.4 25.4	88		51.2 50.8	64.0 63.5	76. 76.	0 6	9.6 8.9	102.4	115.9

N.	0	1	2	8	4	5	6	7	8	9	Diff.
140	531479	1607	1784	1862 8136	1990 3264	2117 3391	2245 3518	2372 3645	2500	2627 3899	128 127
1 2	2754 4026	2882 4153	3009 4280	4407	4534	4661	4787	4914	3772 5041	5167	127
3	5294	5421	5547	5674	5800	5927	6053	6180	6306	6432	126
4	6558	6685	6811	6937	7063	7189	7315	7441	7567	7698	126
5	7819	7945	8071	8197	8322	8448	8574	8699	8825	8951	126
6	9076	8503	9327	9452	9578	9708	9829	9954	0000		400
7	540329	0455	0580	0705	0830	0955	1080	1205	0079 1330	0204 1454	125 125
8	1579	1704	1829	1953	2078	2203	2327	2452	2576	2701	125
9	2825	2950	3074	8199	3323	8447	8571	8698	3820	8944	124
350	4068	4192	4316	4440	4564	4688	4812	4936	5060	5183	124
Ϊl	5307	5431	5555	5678	5802	5925	6049	6172	6296	6419	124
2	6548	6666	6789	6913	7036	7159	7282	7405	7529	7652	128
3	7775	7898	8021	8144	8267	8389	8512	8685	8758	8881	123
4	9003	91:26	9249	9371	9494	9616	9739	9861	9984	0106	123
5-	550228	0351	0473	0595	0717	0840	0962	1084	1206	1328	122
6	1450	1572	1694	1816	1938	2060	2181	2303	2425	2547	122
7	2668	2790	2911	3033	8155	8276	3398	3519	8640	8762	121
8 9	3883 5094	4004 5215	4126 5336	4247 5457	4368 5578	4489 5699	4610 5820	4731 5940	4852 6061	4973 6182	121 121
- 1	6303	6423	6544	6664	6785	6905	7026	7146	7267		120
360 1	7507	7627	7748	7868	7988	8108	8228	8349	8469	7387 8589	120
2	8709	8829	8948	9068	9188	9308	9428	9548	9667	9787	120
ã	9907				-					0101	
- I		0026	0146	0265	0385	0504	0624	0743	0863	0982	119
4	561101	1221	1340	1459	1578	1698	1817	1936	2055	2174	119
5	2293	2412	2581	2650	2769	2887	8006	3125	8244	3362	119
6 7 8	8481	8600	3718	3837	3955	4074	4192	4311	4429	4548	119
7	4666	4784	4908 6084	5021 6202	5139 6320	5257 6437	537 6 655 5	5494	5612	5780	118
9	5848 7026	5966 7144	7262	7879	7497	7614	7732	6678 7849	6791 7967	6909 8084	118 118
- 1			8436	8554	8671	8788	8905				í
370	8202 9374	8819 9491	9608	9725	9842	9959	0900	9023 ,	9140	9257	117
-						'	0076	0198	0309	0426	717
2	570548	0660	0776	0893	1010	1126	1243	1859	1476	1592	117
8	1709	1825	1942	2058	2174	2291	2407	2523	2639	2755	116
4	2872	2988	8104	8220	8336	3452	3568	3684	8800	3915	116
5	4031 5188	4147 5308	4263 5419	4379 5534	4494 5650	4610 5765	4726 5880	4841 5996	4957 6111	5072 6226	116
2	6341	6457	6572	6687	6802	6917	7082	7147	7262	7377	115 115
7 8	7492	7607	7722	7836	7951	8066	8181	8295	8410	8525	115
9	8639	8754	8868	8983	9097	9212	9326	9441	9555	9669	114
'				Рво	PORTIO	NAL PA	RTS.		<u>'</u>	<u>' </u>	'
Diff.	1	2	8	3	4	5	6		7	8	9
128	12.8	25.6	38	4	51.2	64.0	76.8	01	0.6	102.4	115.9
127	12 7	25.0 25.4	88		50.8	63.5	76.2		3.9	102.4 101.6	114.
126	12 6	25.2	87	.8	50.4	63.0	75.6			100.8	113.
125	12.5	25.0	87	.5	50.0	62.5	75.0			100.0	112
124	12.4	24.8	87	.2	49.6	62.0	74.4	86	8	99.2	111.0
123	12.3	24.6	36		49.2	61.5	73.8	86	5.1	98.4	110.
122 121	12.2	24 4	36		48.8	61.0	73.9		.4	97.6	109.8
120	12.1 12.0	24.2 24.0	86 86	. 0	48.4 48.0	60.5 60.0	72.6 72.0	84	.7	96.8 96.0	108.9

TABLE IX.—LOGARITHMS OF NUMBERS.

N.	Ò	1	2	8	4	5	6	7	8	9	Diff.
190	579784	9898	0018	0126	0241	0355	0469	0583	0697	0811	114
1	580925	1039	1153	1267	1381	1495	1608	1722	1836	1950	
2 8	2063	2177	2291	2404	2518	2631	2745 3879	2858	2972	8085	
4	3199 4331	8312 4444	3426 4557	8539 4670	3652 4783	3765 4896	5009	3992 5122	4105 5235	4218 5348	113
	5461	5574	5686	5799	5912	6024	6137	6250	6362	6475	110
5 6 7	6587	6700	6812	6925	7037	7149	7262	7374	7486	7599	
8	7711 8832	7823 8944	7935 9056	8047 9167	8160 9279	8272 9391	8384 9503	8496 9615	8608 9726	8720 9838	112
9	9950					!					
		0061	0173	0284	0396	0507	0619	0730	0842	0953	
390	591065	1176	1287	1399	1510	1621	1732	1843	1955	2066	
1	2177 3286	2258 3397	2399 3508	2510 3618	2621 3729	2732 3840	2843 3950	2954 4061	3064 4171	8175 4282	111
2	4393	4503	4614	4724	4834	4945	5055	5165	5276	5386	i
4	5496	5606	5717	5827	5937	6047	6157	6267	6377	6487	110
5	6597	6707	6817	6927	7037	7146	7256 8353	7366	7476	7586	110
6	7695 8791	7805 8900	7914 9009	8024 9119	8134 9228	8243 9337	9446	8462 9556	8572 9665	8681 9774	
8	9983	9992	5000	8118	8220	3001	2330	8000	3005	3114	109
	600973		0101	0210	0319	0428	0537	0646	0755	0864	103
9		1082	1191	1299	1408	1517	1625	1734	1843	1951	
100	2060	2169	2277 3361	2386	2494	2603	2711	2819	2928	3036	
2	3144 4226	3253 4334	4442	8469 4550	3577 4658	3686 4766	3794 4874	3902 4982	4010 5089	4118 5197	108
2	5305	5413	5521	5628	5736	5844	5951	6059	6166	6274	1
4	5305 6381	6489	6596	6704	6811	6919	7026 8098	7133	7241	7348	
5	7455	7562	7669	7777	7884	7991	8098	8205	8312	8419	107
6	8526 9594	8633 9701	9808	8847 9914	8954	9061	9167	9274	9381	9488	
-		 			0021	0128	0234	0341	0447	0554	ŀ
8	610660	0767	0878	0979	1086	1192	1298	1405	1511	1617	l
9	1723	1829	1936	2042	2148	2254	2360	2466	2572	2678	106
410	2784	2890	2996	3102	3207	8313	8419	3525	3630	8736	1
1 2	3842 4897	3947 5003	4053 5108	4159 5213	4264 5319	4370 5424	4475 5529	4581 5634	4686 5740	4792 5845	ľ
ã-	5950	6055	6160	6265	6370	6476	6581	6686	6790	6895	105
4	7000	7105	7210	7315	7420	7525	7629	7734	783)	7943	
				Pro	PORTIO	nal Pa	RTS.				,
Diff	. 1	2	1	3	4	5	6		7	8	9
118	11.8	23.6	85	.4	47.2	59.0	70.8	3 8	2.6	94.4	106.
117 116	11.7 11.6	23.4 23.2		.1	46.8 46.4	58.5 58.0	70.2 69.6	81 81	1.9	93.6	105.
115	11.5	23.0	84		46.0	57.5	69 () &(0.5	92.8 92.0	104. 103.
114	11.4	22.8	84	.2	45.6	57.5 57.0	68.4	i ñ	9.8	91.2	102.
118	11.8	22.6	83		45.2	56.5	68.4 67.8 67.8	3 79	9.1	90.4	101.
112	11.2	22.4			44.8	56.0	1	1	3.4	89.6	100.
111 110	11.1	22.2 22.0	33	.8	44.4	55.5	66.6		7.7	88.8	99.
109	11.0 10.9	21.8	33		44.0 43.6	55.0 54.5	65.4		7.0	88.0 87.2	99.0 98.
108	10.8	21.6	82	.4	43.2	54.0	64.8	5 2	5.6	86.4	97
107	10.8 10.7	21.4	82	.1	42.8	53.5	64.5	3 74	1.9	85.6	96.
109 108 107 106 105 105	10.6	21.2 21.0	81 81	.8	42.4 42.0	53.0	63.6	74	.2	84.8	95. 94.
		ı xıll								84.0	
105 104	10.5 10.5	21.ŏ	81	.5	42.0	52.5 52.5	63.0 63.0	1 1 %	3.5 3.5	84.0	94.

TABLE IX.-LOGARITHMS OF NUMBERS.

N.	0	1	2	8	4	5	6	7	8	9	Diff.
415	618048	8153	8257	8362	8466	8571	8676	8780	8884	8989	105
415 6	9093	9198	9802	9406	9511	9615	9719	9824	9928		100
7	620136	0240	0844	0448	0552	0656	0760	0864	0968	- 0032 1072	104
8	1176	1280	1384	1488	1592	1695	1799	1903	2007	2110	
9	2214	2318	2421	2525	2628	2732	2835	2939	8042	3146	ļ
420	3249 4282	3353 4385	8456 4488	3559 4591	8663 4695	8766 4798	8869 4901	8973 5004	4076 5107	4179 5210	103
2	5312	5415	5518	5621	5724	5827	5929	6032	6135	6238	100
8	6340 7366	6443 7468	6546 7571	6648 7673	6751 7775	6853 7878	6956 7980	7058 8082	7161 8185	7263 8287	
4 5	8389	8491	8593	8695	8797	8900	9002	9104	9206	9308	102
6	9410	9512	9613	9715	9817	9919	0001	0100	0004	0326	
7	630428	0530	0631	0733	0835	0936	0021 1038	0123 1139	0224 1241	1342	
8	1444	1545	1647	1748	1849	1951	2052	2158	2255	2356	l
. 9	2457	2559	2660	2761	2862	2963	8064	8165	3266	3367	
430	8468	3569	3670	3771	3872	3973	4074 5081	4175	4276 5283	4376 5383	101
2	4477 5484	4578 5584	4679 5685	4779 5785	4880 5886	4981 5986	6087	5182 6187	6287	6388	1
8	6488	6588	6688	6789	6889	6989	7089	7189	7290	7390	
4	7490 8489	7590 8589	7690 8689	7790 8789	7890 8888	7990 8988	8090 9088	8190 9188	8290 9287	8389 9387	100
6	9486	9586	9686	9785	9885	9984		8100			
		0504			0000		0084	0183	0288	0382	
8	640481 1474	0581 1573	0680 1672	0779 1771	0879 1871	1970	1077 2069	1177 2168	1276 2267	1375 2366	
ğ	2465	2568	2662	2761	2860	2959	8058	3156	8255	8854	99
440	3453	8551	8650	8749	3847	3946	4044	4143	4842	4840	l
1	4439	4537	4686	4784	4832	4931	5029	5127	5226 6208	5324 6306	
2	5422 6404	5521 6502	5619 6600	5717 6698	5815 6796	5913 6894	6011 6992	6110 7089	7187	7285	98
4	7383	7481	7579	7676	7774	7872	7969	8067	8165	8262	-
5	8360 9335	8458 9432	8555 9530	8653 9627	8750 9724	8848 9821	8945 9919	9043	9140	9237	ŀ
								0016	0113	0210	İ
7	650308	0405 1375	0502 1472	0599 1569	0696 1666	0793	0890 1859	0987 1956	1084 2053	1181 2150	. 97
8	1278 2246	2343	2440	2536	2633	1762 2730	2826	2923	8019	8116	•
450	8213	3309	3405	8502	8598	3695	3791	3888	3984	4080	1
1	4177	4273	4369	4465	4562	4658	4754	4850	4946	5042	١ ـ
8	5138 6098	5235 6194	5331 6290	5427 6386	5523 6482	6577	5715 6673	5810 6769	5906 6864	6002 6960	96
4	7056	7152	7247	7343	7438	7534	7629	7725	7820	7916	ŀ
5	8011	8107	8202	8298	8393	8488	8584	8679	8774	8870	
6 7	8965 9916	9060	9155	9250	9346	9441	9536	9631	9726	9821	
		0011	0106	0201	0296	6391	0486	0581	0676	0771	95
8	660865 1813	0960 1907	1055 2002	1150 2096	1245 2191	1339 2286	1434 2380	1529 2475	1623 2569	1718 2663	
			,		PORTIO						·
Diff	. 1	2		3	4	5	6	Ī	7	8	9
405	-		- -	-			-		-		-
105 104	10 5	21.0 20 8	81 81	5	42.0 41 6	52 5 52.0	63 (3.5	84 0 83 2	94.
103	10 3	206	80	9	41.2	51 5	61.8	3 73	1	82.4	92
102	10 2 10 1	20.4 20.2	30 30	6	40.8	51 0 50 5	61 8	7	14	81 6	91 90
101 100	10.0	20 0	30	.ö	40.4 40 0	50 D	60.0		66	80 8 80 0 79 2	90.
99	99	19 8	29		39 6	49 5	59 4		3	79.9	89.

N.	0	1	2	8	4	5	6	7	8	9	Diff.
160	662758	2852	2947	3041	3185	3230	3324	3418	8512	3607	
1	3701	3795	3889	3983	4078	4172	4266	4360	4454		
2	4642	4736	4830	4924	5018	5112	5206	5299	5393		94
8	5581	5675	5769	5862	5956	6050	6143	6237	6331	6424	l
4	6 518	6612	6705	6799	6892	6986	7079	7173	7266		ŀ
5	7458	7546 8479	7640	7783 8665	7826 8759	7920 8852	8013 8945	8106 9038	8199 9131		
6 7	8386 9317	9410	8572 9503	9596	9689	9782	9875	9967			
8	670246	0339	0431	0524	0617	0710	0802	0895	0060		98
ğ	1178	1265	1358	1451	1543	1636	1728	1821	1913		
170	2098	2190	2283 3205	2375 3297	2467	2560	2652	2744 3666	2836	2929 3850	İ
2	8021 8942	3113 4034	4126	4218	3390 4310	3482 4402	8574 4494	4586	3758 4677	4769	92
ริ	4861	4953	5045	5137	5228	5320	5412	5503	5595	5687	-
4	5778	5870	5962	6053	6145	6236	6328	6419	6511	6602	į
4 5 6 7	6694	6785	6876	6968	7059	7151	7242	7333	7424	1 7516	ł
6	7607	7698	7789	7881	7972	8063	8154	8245	8336	8427	. ـ
8	8518 9428	8609 9519	8700 9610	8791 9700	8882 9791	8973 9682	9064	9155	9246	9337	91
9	680336	0426	0517	0607	0698	0789	0879	0063 0970	0154 1060		l
480	1241	1332	1422	1513	1603	1693	1784	1874	1964		1
ĭ	2145	2235	2326	2416	2506	2596	2686	2777	2867		ŀ
28	8047	3137	8227	3317	8407	3497	8587	3677	3767	3857	90
	8947	4037	4127	4217	4307	4396-	4486	4576	4666		l
4	4845	4935	5025	5114	5204	5294	5383	5478	5563		l
5	5742 6636	5831 6726	5921 6815	6010 6904	6100 6994	6189	6279	6368	6458	6547	i .
6	7529	7618	7707	7796	7886	7083 7975	7172 8064	7261 8153	7351 8242	8331	٠.
8	8420	8509	8598	8687	8776	8865	8953	9042	9131	9220	89
9	9309	9398	9486	9575	9664	9753	9841	9042 9930	0019	_	
490	690196	0285	0373	0462	0550	0639	0728	0816	0905		l
1	1081	1170	1258	1347	1435	1524	1612	1700	1789	1877	l
2	1965	2053	1258 2142	2230	2318	2406	2494	2583	2671	2759	
8	2847	2935	8023	8111	3199	3287	3375	3463	8551	3639	88
5	8727	3815	8903	8991	4078	4166	4254	4342	4430	4517	!
6	4605	4698 5569	4781	4868	4956	5044	5131	5219	5307	5394	İ
7	5482 6356	6444	5657 6531	5744 6618	5832 6706	5919 6798	6007 6880	6094 6968	6182 7055		ı
8	7229	7817	7404	7491	7578	7665	7752	7830	7926		1
9	8100	8188	8275	8362	8449	8585	8622	7839 8709	8796		87
	·····			Pro	PORTIC	NAL PA	RTS.		<u>'</u>		<u>'</u>
Diff.	1	2	8		4	5	6		7	8	9
98	9.8	19.6	29.	4	39.2	49.0	58.8	66	3.6	78.4	88.
97	9.7	19.4	29.	.1	38.8	48.5	58.2	67	.9	77.6	87.
96	9.6	19.2	28.		38.4	48.0	57.6		.2	76.8	86.
95	9.5	19.0	28. 28.		38.0	47.5	57.0		.5	76.0	85.
97 96 95 94 98	9.4	18.8 18.6	27		37.6 37.2	47.0 46.5	56.4 55.8		.8	75.2 74.4	84. 83.
92	9.2	18.4	27.		36.8	46.0	55.2		.4	78.6	82.
91	9.1	18.2	27.	3	86.4	45.5	54.6	63	.7	72.8	81.
90	9.0	18.0	27.	0	36.0	45.0	54.0	68	.0	72.0	81.
92 91 90 89 88 87	8.9	17.8	26.		85.6	44.5	58.4		.8	71.2	80.
95	8.8	17.6 17.4		4	35.2 34.8	44.0 43.5	52.8	1 61	.6 ¦	70.4 69.6	79. 78.

N.	0	1	2	8	4	5	6	7	8	9	Diff.
500	698970 9838	9057 9924	9144	9231	9317	9404	9491	9578	9664	9751	
1			0011	0098	0184	0271	0858	0444	0531	0617	
2	700704 1568	0790 1654	0877 1741	0963 1827	1050 1918	1136 1999	1222 2086	1309 2172	1395 2258	1482	ļ
4	2431	2517	2603	2689		2861	2947	3033	3119	2844 8205	
5	8291	8377	3463	8549	2775 3635	3721	8807	3893	3979 4837	4065	86
6	4151 5008	4286 5094	4322 5179	4408 5265	4494 5850	4579 5436	4665 5522	4751 5607	4837 5693	4922	
8	5864	5949	6035	6120	6266	6291	6876	6462	6547	5778 6682	
9	6718	6808	6888	6974	7059	7144	7229	7315	7400	7485	1
510	7570	7655	7740	7826	7911	7996	8081	8166	8251	8336	82
1	8421	8506	8591	8676	8761	8846	8931	9015	9100	9185	, a
2	9270	9355	9440	9524	9609	9694	9779	9863	9948	0033	
3	710117	0202	0287	0371	0456	0540	0625	0710	0794	0879	
4	0963	1048	1132	1217	1301	1385	1470	1554	1639	1728	
5 6	1807 2650	1892	1976	2060	2144	2229	2818	2397 3238	2481	2566	
7	3491	2734 3575	2818 3659	2902 8742	2986 3826	3070 3910	8154 8994	4078	3323 4162	8407 4246	84
8	4330	4414	4497	4581	4665	4749	4833	4916	5000	5084	l
9	5167	5251	5335	5418	5502	5586	5669	5753	5836	5920	
520	6003	6087	6170	6254	6337	6421	6504	6588	6671	6754	
1	6838	6921	7004	7088	7171	7254	7338	7421	7504	7587	
2 8	7671 8502	7754 8585	7837 8668	7920 8751	8003 8834	8086 8017	8169 9000	8253 9083	8336 9165	8419 9248	88
4	9331	9414	9497	9580	9663	9745	9828	9911	9994	9440	1
'				0407	0400	0500				0077	1
5	720159 0986	0242 1068	0325 1151	0407 1233	0490 1316	0573 1398	0655 1481	0738 1563	0821 1646	0908 1728	1
7	1811	1893	1975	2058	2140	2222	2305	2387	2469	2552	
8	2634	2716	2798	2881	2963	8045	8127	3209	3291	8874	
9	3456	3538	3620	8702	8784	3866	8948	4030	4112	4194	88
530	4276	4358	4440	4522	4604	4685	4767	4849	4951	5018	
2	5095 5912	5176 5993	5258 6075	5340 6156	5422 6238	5508 6320	5585 6401	5667 6483	5748 6564	5830 6646	
รื	6727	6809	6890	6972	7053	7134	7216	7297	7379	7460	
4	7541	7628	7704	7785	7866	7948	8029	8110	8191	8278	
5 6	8354	8435 9246	8516 9327	8597 9408	8678 9489	9570	8841 9651	8922 9732	9008 9818	9084 9893	81
7	9165 9974	9240	8021	9400	3408	8010	8001	810%	8019	8089	01
		0055	0136	0217	0298	0878	0459	0540	0621	0702	1
8	730782 1589	0863 1669	0944 1750	1024 1830	1105 1911	1186 1991	1266 2072	1347 2152	1428 2233	1508 2313	ŀ
- 1			2555	2635		31		2956		1	
540 1	2394 8197	2474 3278	3358	8438	2715 8518	2796 8598	2876 3679	3759	8037 8839	8117 8919	ĺ
2	8999	4079	4160	4240	4320	4400	4480	4560	4640	4720	80
	4800	4880	4960	5040	5120	5200	5279	5359	5439	5519	٩
4	5599	5679	5759	5838	5918	5998	6078	6157	6287	6817	
				Pro	PORTIO	NAL PA	LRTS.			·	
Diff	. 1	2	8		4	5	6		7	8	9
97	8.7	17.4	26	1	34.8	48 5	52.2	Ar	.9	69 6	78
87 86 85	8.6	17.2	25	â	34.4	43 0	51 6		2	68 8 68.0	77
w	8.5		25		UZ.7	42.5	1 01 0		.5		76

		<u> </u>									L. 767.
N.	0	1	2		4	5	C	7	8	9	Diff.
45	736897	6476	6556	6685	6715	6795	6874	6954	7084	7118	
6	7198	7272	7352	7481	7511	7590	7670	7749	7829	7908	
7	7987	8067	8146	8225	8305	8384	8463	8543	8622	8701	
8	8781	8860	8989	9018	9097	9177	9256	9335	9414	9498	i
9	9572	9651	9781	9810	9889	9968	0047	0126	0205	0284	79
50	740868	0442	0521	0600	0678	0757	0836	0915	0994	1073	"
1	1152	1230	1809	1388	1467	1546	1624	1708	1782	1860	1
2	1939	2018	2096	2175	2254	2332	2411	1708 2489	2568	2647	1
8	2725	2804	2882	2961	8089	8118	8196	8275	8358	8481	
4	3510	3588	3667	3745	3823	3902	3980	4058	4136	4215	l
5	4293	4871	4449	4528	4606	4684	4762	4840	4919	4997	
6	5075	5158	5281	5309	5387	5465	5548	5621	5699	5777	78
7 8	5855 6634	5933	6011	6089	6167	6245	6323	6401	6479	6556	٠
9	7412	6712 7489	6790 7567	6868 7645	6945 7722	7023 7800	7101 7878	7179 7955	7256 8083	7884 8110	
60	8188	8266	8343	8421	8498	8576	8653	8731	8808	8885	
1 2	8963 9786	9040 9814	9118 9891	9195 9968	9272	9350	9427	9504	9582	9659	}
- 1					0045	0123	0200	0277	0354	0431	
3	750508	0586	0663	0740	0817	0894	0971	1048	1125	1202	
4	1279	1356	1488	1510	1587	1664	1741	1818	1895	1972	77
5	2048	2125	2202	2279	2356	2433	2509	2586	2668	2740	
6	2816	2898	2970	3047	3123	8200	8277	8858	3430	8506	
7	3583	3660	3736	8813	3889	3966	4042	4119	4195	4272	l
8	4348 5112	4425 5189	4501 5265	4578 5341	4654 5417	4730 5494	4807 5570	4888 5646	4960 5722	5086 5799	
570	5875	5951	6027	6108	6180	6256	6332	6408	6484	6560	l
ĭi	6636	6712	6788	6864	6940	7016	7092	7168	7244	2390	76
2	7396	7479	7548	7624	7700	7775	7851	7927	8003	7320 8079	10
3	8155	7472 8280	8806	8382	8458	8533	8609	8685	8761	8836	1
4	8912	8988	9063	9139	9214	9290	9366	9441	9517	9592	l
5	9668	9748	9819	9894	9970	0045	0121	0196	0272	0847	
6	760422	0498	0578	0649	0724	0799	0875	0950	1025	1101	
7	1176	1251	1326	1402	1477	1552	1627	1702	1778	1853	ļ
8	1928	2008	2078	2153	2228	2303	2378	2458	2529	2604	l
9	2679	2754	2829	2904	2978	3053	8128	8208	3278	3358	75
580	8428	8508	8578	8653	8727	8802	3877	8952	4027	4101	
1	4176	4251	4326	4400	4475 5221	4550	4624	4699	4774	4848	
2 8	4923 5669	4998 5748	5072 5818	5147 5892	5966	5296	5870 6115	5445 6190	5520 6264	5594 6388	l
4	6418	6487	6562	6686	6710	6041 6785	6859	6988	7007	7082	1
		!	1	Pro	PORTIC	NAL P.	ARTS,	<u>'</u>		<u></u>	<u> </u>
Diff.	1	2	1	3	4	5	6		7	8	9
88	8.8	16.6	24	.9	88.2	41.5	49.8	3 5	8.1	66.4	74.
83	8.2	16.4	24	.6	32.8	41.0	49.5	3 5	7.4	65.6	73.
82 81	8.1	16.2	24		82.4	40.5	48.6		6.7	64.8	72.
80	8.0	16.0	24	.0	32.0	40.0	48.0		6.0	64.0	<u>72</u> 3.
79 78 77	7.9	15.8	23	.7	81.6	89.5	47.4	<u> 5</u>	5.8	63.2	71.
78	7.8	15.6	23	.4	81.2	89.0	46.8	5 5	4.6	62.4	70.
77	7.7	15.4 15.2	23 22		80.8 80.4	88.5 88.0	46.9		8.9 8.2	61.6 60.8	69. 68.
76 75	7 6 7.5	15.2	22		80.4 80.0	87.5	45.0		2.5	60.0	67.

N.	0	1	2	8	4	5	6	7	8	9	Diff.
585	767156	7230	7804	7879	7453	7527	7601	rom	77740	mpon	
ooo A	7898	7972	8046	8120	8194	8268	8342	7675 8416	7749 8490	7823 8564	74
7	8688	8712	8786	8860	8934	9008	9082	9156	9230	9303	14
8	9877	9451	9525	9599	9673	9746	9820	9894	9968	3000	
					<u> </u>	''				0042	
9	770115	0189	0263	0386	0410	0484	0557	0631	0705	0778	1
590 1	0852	0926 1661	0999 1734	1073 1808	1146 1881	1220	1298 2028	1367 2102	1440 2175	1514 2248	
2	1587 2322	2395	2468	2542	2615	1955 2688	2762	2835	2908	2981	
3	3055	3128	8201	8274	8348	3421	3494	3567	3640	8713	
4	8786	3860	8933	4006	4079	4152	4225	3567 4298	4371	4444	78
7	4517	4590	4888	4786	4809	4882	4955	5028	5100	5173	•••
5	5946	5819	4668 5892	5465	5538	5610	5688	RYKE	5100 5829	5902	l
7	5246 5974	6047	6120	6193	6265	5610 6338	6411	6488	6556	6629	ŀ
8	6701	6774	6846	6919	6992	7064	7137	7209	7282	7354	
9	7427	7499	7572	7644	7717	7789	7862	7934	8006	8079	
800	8151	8224	8296	8368	8441	8513	8585	8658	8730	8802	
1	8874 9596	8947 9669	9019 9741	9091 9813	9163 9885	9236 9957	9308	9380	9452	9524	
2	8090	9009	9/41	9019	8000	9901	0029	0101	0173	0245	
8	780317	0389	0461	0533	0605	0677	0749	0821	0898	0965	72
4	1037	1109	1181	1253	1324	1396	1468	1540	1612	0965 1684	l
5	1755	1827	1899	1253 1971	2042	2114	2186	2258	2329	2401	l
6	2478	2544	2616	2688	2759	2831	2902	2974	3046	8117	ı
7	8189	3260	3332	3403	8475	3546	3618	8689	8761	8832	ł
8	8904	8975	4046	4118	4189	4261	4332	4403	4475	4546	l
ğ	4617	4689	4760	4831	4902	4974	5045	5116	5187	5259	
810	5330	5401	5472	5548	5615	5686	5757	5828	5899	5970	
1	6041	6112	6183	6254	6325	6396	6467	6538	6609	6680	71
2	6751	6822	6893	6964	7035	7106	7177	7248	7819	7890 8098	i
8	7460	7531 8239	7602	7678	7744	7815 8522	7885	7956	8027	8098	ŀ
4	8168	8239	8310	8881	8451	8522	8593	8663	8784	8804	
5	8875	8946	9016	9087	9157	9228	9299	9369	9440	9510	ł
6	9581	9651	9722	9792	9863	9933	0004	0074	0144	0015	
7	790285	0356	0426	0496	0567	0637	0707	0778	0848	0215 0918	
8	0988	1059	1129	1199	1269	1340	1410	0778 1480	1550	1620	
9	1691	1761	1831	1901	1971	2041	2111	2181	2252	2322	
320	2392	2462	2532	2602	2672	2742	2812	2882	2952	3022 .	70
1	3092	8162	3231	8301	3371	3441	3511	3581	3651	3721	
2	3790	8860	3930	4000	4070	4139	4209	4279	4349	4418	
8	4488	4558	4627	4697	4767	4836	4906	4976	5045	5115	
4	5185	5254	5824	5898	5463	5532	5602	5672	5741	5811	
5 6	5880	5949	6019	6088	6158	6227	6297	6866	6436	6505	
2	6574	6644	6718	6782	6852	6921	6990	7060	7129	7198	
6	7268	7837 8029	7406 8098	7475 8167	7545 8236	7614 8305	7683 8374	7752 8443	7821 8513	7890 8582	
7 8 9	7960 8651	8720	8789	8858	8927	8996	9065	9134	9203	9272	69
•	0001	3120	3100	3300	3021	0000	- AVA	9104	<i>a</i>	0214	U9
				Pro	PORTIO	NAL PA	RTS.				
Diff	. 1	2	8	3	4	5	6	1	7	8	9
	-		-	-			i	- -			
75	7.5	15.0	22	.5	80.0	37.5	45.0) 5	2.5	60.0	67.
74 78 72 71	7.4	14.8	22	.얼	29.6	37.0 36.5	44.4 43.8	5	1.8	59.2	66.
78	7.8	14.6	21	ا لا	29.2	80.0	40.5	1 5		58.4	65.
72	7.2	14.4	21	. D	28.8	86.0	43.8	0	0.4	57.6 56.8	64.
71	7.1	14.2	21	.as (28.4	85.5	42 6	45	• 7 1	DO. N	63.
70	7.0	14.0	21 20		28.0 27.6	85.0	42.0	نتا	5.ò	56.0 55.2	63.

TABLE IX.-LOGARITHMS OF NUMBERS.

	1 .		1	· · · · · ·	ī	11	1			1	
N.	0	1	2	8	4	5	6	7	8	9	Diff.
630	799341	9409	9478	9547	9616	9685	9754	9823	9892	9961	
1	800029	0098	0167	0236	0305	0873	0442	0511	0580	0648	ļ
2	0717	0786	0854	0923	0992	1061	1129	1198	1266	1335 2021	1
8	1404	1472	1541	1609	1678	1747	1815	1884	1952	2021	1
4	2089	2158	2226	2295	2363	2432	2500	2568	2637	2705	1
5	2774	2842	2910	2979	3047	8116	3184	3252	3321	3389	1
6	8457	8525	3594	3662	3730	3798	3867	3935	4003	4071	ı
7	4139	4208	4276	4344	4412	4480	4548	4616	4685	4758	·
8	4821	4889	4957	5025	5093	5161	5229	5297	5365	5433	68
9	5501	5569	5637	5705	5773	5841	5908	5976	6044	6112	l
64 0	806180	6248	6316	6384	6451	6519	6587	6655	6723	6790	l
1	6858	6926	6994	7061	7129	7197	7264	7332	7400	7467	ı
2	7535	7608	7670	7738	7806	7873	7941	8008	8076	8143	l
8	8211	8279	8346	8414	8481	8549	8616	8684	8751	8818	l l
4	8886	8953	9021	9088	9156	9223	9290	9358	9425	9492	1
5	9560	9627	9694	9762	9829	9896	9964			-	1
	040000	0000	0000	0404	0500	00.55	0000	0031	0098	0165	1
6	810233	0800	0367	0434	0501	0569	0636	0703	0770	0837	
7	0904	0971	1039	1106	1178	1240	1307	1374	1441	1508	67
8	1575 2245	1642 2312	1709	1776	1843	1910	1977	2044	2111	2178	
9	22240		2379	2445	2512	2579	2646	2713	2780	2847	ł
850	2913	2980	3047	8114	3181	3247	3314	3381	3448	3514	1
1	3581	3648	3714	3781	3848	3914	3981	4048	4114	4181	1
8	4248	4314	4881	4447	4514	4581	4647	4714	4780	4847	1
8	4913	4980	5046	5113	5179	5246	5312	5378	5445	5511	1
4	5578	5644 6308	5711	5777	5843	5910	5976 6639	6042	6109	6175	1
5	6241	6308	6374	6440	6506	6578	6639	6705	6771	6838	i
6	6904	6970	7086	7102	7169	7235	7301	7367	7433	7499	l
7	7565	7631	7698	7764	7830	7896	7962	8028	8094	8160	ŀ
9	8226 8885	8292 8951	8358 9017	8424 9083	8490 9149	8556 9215	8622 9281	8688 9346	8754 9412	8820 9478	66
660	9544	9610	9676	9741	9807	9873	9939	9040	8412	9410	
								0004	0070	0136	
1	820201	0267	0888	0399	0464	0530	0595	0661	0727	0792	1
2	0858 1514	0924 1579	0989 1645	1055	1120 1775	1186 1841	1251 1906	1317 1972	1382 2037	1448	1
4	2168	2233	2299	1710 2364	2430	2495	2560	2626	2691	2108 2756	
5	2822	2887	2952	3018	3083	3148	3213	3279	3344	3409	1
6	8474	8589	3605	3670	3735	3800	3865	3930	3996	4061	
7	4126	4191	4256	4821	4386	4451	4516	4581	4646	4711	
8	4776	4841	4906	4971	5036	5101	5166	5231	5296	5361	65
9	5426	5491	5556	5621	5686	5751	5815	5880	5945	6010	
370	6075	6140	6204	6269	6334	6399	6464	6528	6593	6658	l
"1	6723	6787	6852	6917	6981	7046	7111	7175	7240	7305	ĺ
2	7369	7434	7499	7563	7628	7692	7757	7821	7886	7951	ı
8	8015 8660	8080	8144	8209	8273	8338	8402	8467	8531	8595	l
4	8660	8724	8789	8853	8918	8982	9046	9111	9175	9239	
!				Рво	PORTIO	 NAL PA	RTS.			•	
Diff	1	2	8		4	5	6	T .	7	8	9
	-		-	_ -				-			
68	68	13 6	20		27 2	34 0	40 8	47		54 4	61 2
67	6 7	13 4 13.2	20 19		26 8 26 4	33 5 83 0	40 2	46		53 6 52 8	60 3 59 4
66 65	65	13.2	19		26.4	82.5	39 6 39 0	45		52 0	58 5

N.	0	1	2	8	4	5	6	7	8	9	Diff.
675	829304	9368	9432	9497	9561	9625	9690	9754	9818	9882	
6	9947	0011	0075	0139	0204	0268	0832	0396	0460	0525	
7	830589	0653	0717	0781	0845	0909	0978	1087	1102	1166	
8	1230 1870	1294 1934	1358	1422	1486	1550	1614	1678	1742 2381	1806 2445	64
380	2509	2573	1998 2637	2062	2126	2189	2253 2892	2317 2956	8020	3083	
ω 1	8147	8211	8275	3338	2764 3402	3466	3530	3593	8657	8721	}
.2	3784	3848	8912	3975	4039	4103	4166	4230	4294	4357	l
8	4421	4484	4548	4611	4675	4739	4802	4866	4929	4998	1
4	5056	5120	5183	5247	5310	5373	5437	5500	5564	5627	l
5	5691	5754	5817	5881	5944	6007	6071	6134	6197	6261	1
6	6324	6387	6451	6514	6577	6641	6704	6767	6880	6894	1
8	6957 7588	7020 7652	7083 7715	7146 7778	7210 7841	7278 7904	7336 7967	7399 8030	7462 8098	7525 8156	1
9	8219	8282	8345	8408	8471	8534	8597	8660	8723	8786	68
390	8849	8912	8975	9038	9101	9164	9227	9289	9852	9415	
1	9478	9541	9604	9667	9729	9792	9855	9918	9981		
	040400	0100	0000	0004	0050	0.000	0400	05.45	0000	0048	1
2 3	840106 0733	0169 0796	0232 0859	0294	0357 0984	0420 1046	0482 1109	0545 1172	0608 1284	0671 1297	l
4	1359	1422	1485	1547	1610	1672	1785	1797	1860	1922	l
5	1985	2047	2110	2172	2235	2297	2360	2422	2484	2547	l
6	2609	2672	2784	2796	2859	2921	2983	3046	8108	8170	1
7	3233	8295	3357	3420	3482	8544	8606	3669	8781	8798	
8	3855	3918	8980	4042	4104	4166	4229	4291	4858	4415	l
9	4477	4539	4601	4664	4726	4788	4850	4912	4974	5086	
700	5098 5718	5160 5780	5222 5842	5284 5904	5346 5966	5408 6028	5470 6090	5532 6151	5594 6218	5656 6275	62
2	6337	6399	6461	6528	6585	6646	6708	6770	6882	6894	
8	6955	7017	7079	7141	7202	7264	7326	7388	7449	7511	
4	7578	7634	7696	7758	7819	7881	7948	8004	8066	8128	ļ
5	8189	8251	8312	8374	8485	8497	8559	8620	8682	8743	
6	8805	8866	8928	8989	9051	9112	9174	9235	9297	9858	
7	9419	9481	9542	9604	9665	9726	9788	9849	9911	9972	
8	850033 0646	0095 0707	0156 0769	0217 0830	0279 0891	0340 0952	0401 1014	0462 1075	0524 1136	0585 1197	
10	1258	1320	1381	1442	1503	1564	1625	1686	1747	1809	
1	1870	1931	1992	2053	2114	2175	2236	2297	2358	2419	
2	2480	2541	2602	2663	2724	2785	2846	2907	2968	3029	61
8	3090	3150	8211	3272	8333	3394	8455	3516	8577	3637	
4	3698	3759	3820	3881	3941	4002	4068	4124	4185	4245	
5	4306 4913	4367 4974	4428 5034	4488 5095	4549 5156	4610 5216	4670	4781 5887	4792 5398	4852 5459	
7	5519	5580	5640	5701	5761	5822	5277 5882	5943	6008	6064	
8	6124	6185	6245	6306	6366	6427	6487	6548	6608	6668	
9	6729	6789	6850	6910	6970	7031	7091	7152	7212	7272	
				Pro	PORTIC	NAL PA	RTS.			<u>'</u>	
Diff	2. 1	2	8	3	4	5	6		7	8	9
65	6.5	18.0	19		26.0	82.5	39.0	48	.5	52.0	58.
64 63	6.4	12.8	19	.2	25.6	32.0	38.4 37.8	44	1.8	51.2	57.0
62	6.8	12.6 12.4	18 18		25.2 24.8	81.5 81.0	37.8	44	.1	50.4	56.
61	6.1	12.2	18		24.4	80.5	37.2 36.6	40	.7	49.6 48.8	55. 54.

	1		1					1			1
N.	0	1	2	8	4	5	6	7	8	9	Diff.
720	857332	7393	7458	7513	7574	7684	7694	7755	7815	7875	
1	7985	7995	8056	8116	8176	8236	8297	8857	8417	8477	
28	8537	8597	8657	8718	8778	8888	8898	8958	9018	9078	1
	9188	9198	9258	9318	9879	9489	9499	9559	9619	9679	60
4	9789	9799	9859	9918	9978	0088	0098	0158	0218	0278	1
5	860338	0898	0458	0518	0578	0637	0697	0757	0817	0877	i
Ğ	0937	0996	1056	1116	1176	1286	1295	1855	1415	1475	l
7	1584	1594	1654	1714	1778	1888	1893	1952	2012	2072	l
8	2181	2191	2251	2310	2970 2966	2480	2489	2549	2608 3204	2668	l
9	2728	2787	2847	2906	1.000	8025	8085	81 14		3263	1
730	3823	3382	3442	3501	8561	8620	8680	3739	3799	3858	í
1	8917	8977	4096 4630	4096 4689	4155 4748	4214 4808	4274 4867	4333 4926	4392	4452 5045	1
2 8	4511 5104	4570 5168	5222	5282	5841	5400	5459	5519	4985 5578	5687	1
4	5696	5755	5814	5874	5983	5992	6051	6110	6169	6228	1
5	6287	6846	6405	6465	6524	6583	C642	6701	6760	6819	59
6	6878	6987	6996	7055	7114	7178	7282	7291	7850	7409	OF
7	7467	7526	7585	7644	7708	7762	7821	7880	7989	7998	ł
8	8056 8644	8115 8703	8174 8762	8233 8821	8292 8879	8350 8938	8409 8997	8468 9056	8527 9114	8586	1
_	1			1	1	11	1	1		91.8	
740	9232	9290	9349	9408	9466	9525	9584	9642	9701	9760	İ
1	9818	9877	9935	9994	0053	0111	0170	0228	0287	0845	İ
2	870404	0462	0521	0579	0638	0696	0755	0813	0872	0930	!
8	0989	1047	1106	1164	1223	1281	1889	1398	1456	1515	1
4	1578	1681	1690	1748	1806	1865	1928	1981	2040	2098	ĺ
5	2156	2215	2278	2381	2389	2448	2506	2564	2622	2681	l
6	2789 8321	2797 8379	2855 3437	2918 8495	2972 8558	3030	3088	8146	3204	8262	1
7 8	8902	8960	4018	4076	4184	3611 4192	8869 4250	3727 4308	8785 4866	3844 4424	58
9	4482	4540	4598	4656	4714	4772	4830	4888	4945	5008	۰ 🛰
50	5061	5119	5177	5285	5298	5851	5409	5466	5524	5582	
3	5640	5698	5756	5818	5871	5929	5987	6045	6102	6160	
2	6218	6276	6333	6391	6449	6507	6564	6622	6680	6787	
8	6795	6853	6910	6968	7026	7083	7141	7199	7256	7814	
4	7871	7429	7487	7544	7602	7659	7717	7774	7882	7889	
5	7947 8522	8004 8579	8062 8687	8119 8694	8177	8234 8809	8292 8866	8849 8924	8407 8981	8464	
7	9096	9158	9211	9268	8752 9825	9883	9440	9497	9555	9039 9612	
8	9669	9796	9784	9841	9898	9956				8012	
9	880242	0299	0856	0418	0471	0528	0013 0585	0070 0642	0127 0699	0185 0756	
160	0814	0871	0928	0985	1042	1099	1156	1218	1271	1828	
۳ ا	1885	1442	1499	1556	1613	1670	1727	1784	1841	1898	
2	1955	2012	2069	2126	2183	2240	2297	2354	2411	2468	57
8	2525	2581	2638	2695	2752	2809	2866	2923	2980	8087	,
4	8098	8150	8207	3264	8821	8377	8434	8491	8548	8605	
<u>'</u>		·'		Pro	PORTIO	NAL PA	RTS.	<u>_</u>			
Diff	. 1	2	8		4	5	6		7	8	9
**	* 6		_	~ -		^^ *	-	_	_	45.0	
59 58	5.9	11.8 11.6	17		23.6 23.2	29.5	85.4		.8	47.2	58.
57	5.7	11.4	17		22.8	29.0 28.5	84.8 84.2).6).9	46.4 45.6	52. 51.
	5.6	11.2	16.		22.4	28.0	83.6			₩. ∪	U1.0

N.	0	1	2	8	4	5	6	7	8	9	Diff.
 765	883661	3718	8775	3832	3888	8945	4002	4059	4115	4172	
6	4229	4285	4342	4399	4455	4512	4569	4625	4682	4739	
7	4795	4852	4909	4965	5022	5078	5135	5192	5248	5305	1
8	5861 5926	5418 5983	5474 6039	5531 6096	5587 6152	5644 6209	5700 6265	5757 6321	5813 6378	5870 6434	
770	6491	6547	6604	6660	6716	6778	6829	6885	6942	6998	
1	7054	7111	7167	7223	7280 7842	7336 7898	7392 7955	7449	7505 8067	7561 8128	1
2 8	7617 8179	7674 8236	7730 8292	7786 8348	8404	8460	8516	8011 8573	8629	8685	l
4	8741	8797	8853	8909	8965	9021	9077	9134	9190	9246	l
5	9302	9358	9414	9470	9526	9582	9638	9694	9750	9806	56
6	9862	9918	9974	0030	0086	0141	0197	0253	0309	0365	Ì
7	890421	0477	0533	0589	0645	0700	0756	0812	0868	0924	l .
8	0980	1035	1091	1147	1203	1259	1314	1370	1426	1482 2089	ì
9 780	1537 2095	1593 2150	1649 2206	1705 2262	1760 2317	1816 2873	1872 2429	1928 2484	1988 2540	2595	1
1	2651	2707	2762	2818	2873	2929	2985	3040	3096	8151	l
2	3207	8262	3318	8378	3429	3484	3540	3595	8651	3706	1
8	8762	8817	3873	3928	3984	4039	4094	4150	4205	4261	ĺ
4	4816	4371	4427	4482	4538	4598	4648	4704	4759	4814	l
5	4870	4925	4980	5086	5091	5146	5201	5257	5812	5367	
6	5423	5478	5533	5588	5644	5699	5754	5809	5864	5920	
7 8	5975 6526	6030 6581	6085 6636	6140	6195 6747	6251 6802	6306 6857	6361 6912	6416 6967	7022	
9	7077	7132	7187	7242	7297	7852	7407	7462	7517	7572	۔۔
790	7627	7682	7737	7792	7847	7902	7957	8012	8067	8122	55
1	8176	8231	8286	8341	8396	8451	8506	8561	8615	8670	l
2	8725	8780	8835	8890	8944	8999	9054	9109	9164	9218	l
3 4	9273 9821	9328	9383 9930	9437 9985	9492	9547	9602	9656	9711	9766	
•		2010		0000	0039	0094	0149	0203	0258	0812	1
5	900367	0422	0476	0581	0586	0640	0695	0749	0804	0859	İ
6	0913	0968	1022	1077	1131	1186	1240	1295	1349	1404	ı
7	1458	1518	1567	1622	1676	1731	1785	1840	1894	1948	i
8	2003 2547	2057 2601	2112 2655	2166 2710	2221 2764	2275 2818	2329 2873	2384 2927	2438 2981	2492 3036	1
300	3090	8144	3199	3253	8307	3361	8416	8470	8524	3578	
1	3633	3687	8741	8795	3849	8904	8958	4012	4066	4190	1
2	4174	4229	4283	4337	4391	4445	4499	4553	4607	4661	l
3	4716	4770	4824	4878	4932	4986	5040	5094	5148	5202	54
4 5	5256 5796	5310 5850	5364 5904	5418 5958	5472 6012	5526 6066	5580 6119	5634 6173	5688 6227	5742 6281	-
6	6335	6389	6443	6497	6551	6604	6658	6712	6766	6820	1
7	6874	6927	6981	7035	7089	7148	7196	7250	7804	7358	l
8	7411	7465	7519	7578	7626	7680	7784	7787	7841	7895	١.
9	7949	8002	8056	8110	8163	8217	8270	8324	8378	8481	
	!	'	1	Рво	PORTIO	NAL PA	RTS.		<u>'</u>		<u>'</u>
Dif	t. 1	2	;	3	4	5	6		7	8	9
			_	_ -				- -			-
57 56		11.4 11.2		·1	22.8 22.4	28.5	84.9		9.9	45.6	51.
55	5.5	11.0			٠٠. ١	28.0	33.6	, 39	9.2	44.8	50.
ວວ				.a. I	22.0	27.5	33.0) 36	3.5	44.0	49.

	10 L. 90	~]							[IV	o. 854]	u. 201.
N.	0	1	2	8	4	5	6	7	8	9	Diff.
310	908485	8539	8592	8646	8699	8758	8807	8860	8914	8967	
1 2	9021 9556	9074 9610	9128 9663	9181	9235 9770	9289 9823	9342	9396 9980	9449 9984	9503	
z	8000	8010	9005	9716	8110	9623	9877	8900	3904	0037	
8 4	910091 0624	0144 0678	0197 0731	0251 0784	0304 0838	0358 0891	0411	0464	0518 1051	0571 1104	
5	1158	1211	1264	1817	1371	1424	0944 1477	0998 1530	1584	1637	
6	1690	1743	1797	1850	1903	1956	2009	2063	2116	2169	
8	2222 2753	2275 2806	2328 2859	2381 2913	2435 2966	2488 3019	2541 3072	2594 3125	2647 3178	2700 3231	
9	3284	8337	8390	3448	3496	3549	3602	3655	3708	8761	53
320	8814	3867	8920	8973	4026	4079	4132	4184	4237	4290	
1	4343	4396	4449	4502	4555	4608	4660	4713	4766	4819	ŀ
2	4872 5400	4925 5458	4977 5505	5030 5558	5088 5611	5136 5664	5189 5716	5241 5769	5294 5822	5847 5875	
8	5927	5980	6033	6085	6138	6191	6243	6296	6349	6401	
5	6454	6507	6559	6612	6664	6717	6770	(822	6875	6927	1
5 6 7 8	6980 7506	7033 7558	7085 7611	7188 7663	7190 7716	7243 7768	7295 7820	7848 7873	7400 7925	7453 7978	
8	8080	8083	8135	8188	8240	8293	8345	8397	8450	8502	
9	8555	8607	8659	8712	8764	8816	8869	8921	8973	9026	
830	9078	9130	9183	9235	9287	9340	9392	9444	9496	9549	
1	9601	9653	9706	9758	9810	9862	9914	9967	0019	0071	
2	920123	0176	0228	0280	0332	0384	0436	0489	0541	0598	
8	0645 1166	0697 1218	0749 1270	0801 1322	0853 1374	0906 1426	0958	1010 1530	1062 1582	1114	52
5	1686	1788	1790	1842	1894	1946	1478 1998	2050	2102	2154	
6	2206	2258	2310	2362	2414	2466	2518	2570	2622	2674	
8	2725 8244	2777 3296	2829 3348	2881 3399	2933 3451	2985 3503	3037 3555	3089 3607	3140 3658	3192 3710	
9	8762	3814	8865	8917	8969	4021	4072	4124	4176	4228	
840	4279	4331	4383	4434	4486	4538	4589	4641	4698	4744	
1	4796	4848	4899	4951	5003	5054	5106	5157	5209	5261	ł
2 3	5312 5828	5364 5879	5415 5981	5467 5982	5518 6034	5570 6085	5621 6137	5673 6188	5725 6240	5776 6291	
4	6842	6394	6445	6497	6548	6600	6651	6702	6754	6805	i
5	6857	6908	6959	7011	7062	7114	7165	7216	7268	7819	ł
7	7370 7883	7422 7985	7478 7986	7524 8037	7576 8088	7627 8140	7678 8191	7780 8242	7781 8293	7832 8345	
8 9	8396	8447	8498	8549	8601	8652	8703	8754	8805	8857	1
9	8908	8959	9010	9061	9112	9163	9215	9266	9317	9368	ì
850	9419	9470	9521	9572	9623	9674	9725	9776	9827	9879	51
-	8800	9901	0032	0088	0134	0185	0236	0287	0338	0389	Ì
2	930440	0491	0542	0592	0643	0694	0745	0796	0847	0898	l
1	9930	9981	0032	0088	0184	0185	0236	0287	0338	0389	
Diff	. 1	2	,	PRO	PORTIO	NAL PA	ARTS.	1	7	8	9
	<u> </u>		_				-		_		
58	5.8	10.6	15	.9	21.2	26.5	31.	8 8	7.1	42.4	47.
52 51	5.2 5.1	10.4	15	.6	20.8 20.4	26.0 25.5	31.3 30.	2 8	6.4 5.7	41.6 40.8	46. 45.

TABLE IX.-LOGARITHMS OF NUMBERS.

N.	0	1	2	8	4	5	6	7	8	9	Diff.
355	981966	2017	2068	2118	2169	2220	2271	2322	2372	2428	
6	2474	2524	2575	2626	2677	2727	2778	2829	2879	2930	ļ
7	2981	3031	3082	8138	3183	3234	3285	3335	8386	3437	ļ
8	3487 3993	3538 4044	3589 4094	3639 4145	3690 4195	3740 4246	3791 4296	3841 4347	3892 4397	3943 4448	
360 i	4498	4549	4599	4650	4700	4751	4801	4852	4902	4958	
1	5008	5054	5104	5154	5205	5255	5806	5356	5406	5457	
2	5507	55584	5608	5658	5709	5759	5809	5860	5910	5960	
8	6011	6061	6111	6162	6212	6262	6313	6363 6865	6413	6468	l
4	6514 7016	6564 7066	6614 7116	6665 7167	6715 7217	6765 7267	6815 7317	7367	6916 7418	6966 7468	ļ
5	7518	7568	7618	7668	7718	7769	7819	7869	7919	7969	
7	8019	8069	8119	8169	8219	8269	8320	8370	8420	8170	50
8	8520	8570	8620	8670	8720	8770	8820	8870	8920	8970	l
9	9020	9070	9120	9170	9220	9270	9320	9369	9419	9469	
370	9519	9569	9619	9669	9719	9769	9819	9869	9918	9968	
1	940018	0068	0118	0168	0218	0267	0317	0367	0417	0467	
2	0516 1014	0566 1064	0616 1114	0666 1168	0716 1213	0765 1263	0815 1813	0865 1362	0915 1412	0964 1462	
4	1511	1561	1611	1660	1710	1760	1809	1859	1909	1958	
5	2008	2058	2107	2157	2207	2256	2306	2355	2405	2455	1
6	2504	2554	2603	2653	2702	2752	2801	2851	2901	2950	l
7	8000	8049	3099	3148	3198	3247	3297	8346	3396	8445	1
8	8495 8989	8544 4038	8593 4088	3648 4137	3692 4186	3742 4236	8791 4285	8841 4335	8890 4384	3939 4433	
80	4483	4532	4581	4681	4680	4729	4779	4828	4877	4927	ŀ
1	4976	5025	5074	5124	5173	5222	5272	5821	5870	5419	İ
2	5469	5518	5567	5616	5665	5715	5764	5813	5862	5912	
8	5961	6010	6059	6108	6157	6207	6256	6805	6354	6408	
4	6452	6501	6551	6600	6649	6698	6747	6796	6845	6894	
5	6943 7434	6992 7488	7041 7582	7090 7581	7139 7630	7189 7679	7238 7728	7287 7777	7336 7826	7385 7875	49
7	7924	7978	8022	8070	8119	8168	8217	8266	8315	8864	
8	8413	8462	8511	8560	8608	8657	8706	8755	8804	8858	
9	8902	8951	8999	9048	9097	9146	9195	9244	9292	9341	
90	9890 9878	9439 9926	9488 9975	9536	9585	9684	9688	9781	9780	9829	
- 1				0024	0078	0121	0170	0219	0267	0816	
2	950365	0414	0462	0511	0560	0608	0657	0706	0754	0808	
8	0851 1338	0900 1886	0949 1485	0997 1483	1046 1582	1095 1580	1143 1629	1192 1677	1240 1726	1289 1775	
5	1823	1872	1920	1969	2017	2068	2114	2163	2211	2260	
6	2308	2356	2405	2453	2502	2550	2599	2647	2696	2744	
7	2792	2841	2889	2938	2986	3034	3083	8181	3180	3228	
8	8276 8760	3325 3808	3378 8856	3421 8905	8470 8958	8518 4001	8566 4049	3615 4098	3663 4146	3711 4194	
١	0100	3000	~~~		0.00	4001	1010	1000	2740	1.07	
									•		
			-	PRO	PORTIO	NAL PA	RTS.				
Diff.	1	. 5	8		4	5	6		7	8	9
51	5.1	10.2	15.		20.4	25.5	80.6	85	.7	40.8	45.9
50	5.0 4.9	10.0	15.		20.0	25.0	80.0	35	ا ۾	40.0	45.0
49		9.8	14.		19.6	24.5	29.4	84		89.2	44.1

N. 900 1 2 8 4 5 6 7 8 9 910 1 2 8 4 5 6 7 8 9	954943 47725 58907 56883 61683 6649 77128 9666 85644 9041 9618 9995 980471 1421 1121 1223 12369 22369 22445 3316	4291 4773 5255 5736 6216 6697 7176 8134 8612 9089 9566 0042 0518 0994 1469 1943 2417	4839 4821 5308 5784 6265 6745 7708 8181 8659 9137 9614	4887 4869 5351 5832 6313 6793 7272 7751 8229 8707 9185 9661 0138 0613	4435 4918 5399 5880 6361 6840 7799 8277 8755 9232 9709	4484 4966 5447 5928 6409 6888 7368 7847 8325 8803 9280 9757	4532 5014 5495 5976 6457 6936 7416 7894 8373 8850 9328 9804	4580 5062 5543 6024 6505 6984 7464 7942 8421 8898 9375	4628 5110 5592 6072 6583 7083 77512 7790 8468 8946	4677 5158 5640 6120 6601 7060 7559 8038 8516 8994 9471	Diff.
1 2 3 4 5 6 7 8 9 9 10 12 8 4 5 6 7	4725 5207 5688 6168 6649 7128 8086 8664 9041 9518 9995 980471 1885 2369 2848	4773 5255 5736 6216 6697 7176 7655 8134 8612 9089 9566 0042 0518 0994 1469 1943 2417	4821 5908 5784 6265 6745 7224 7708 8181 8659 9187 9614 0090 0566 1041	4869 5351 5832 6313 6793 7272 7751 8229 8707 9185 9661	4918 5399 5880 6361 6840 7320 7799 8277 8755 9232 9709	4966 5447 5928 6409 6888 7368 7847 8325 8803 9280	5014 5495 5976 6457 6936 7416 7894 8878 8850 9328	5062 5548 6024 6505 6964 7464 7942 8421 8898	5110 5592 6072 6558 7082 7513 7990 8468 8946	5158 5640 6120 6601 7080 7559 8038 8516 8994	48
284 567 89 910 12 84 567	5907 5688 6168 6649 7128 7607 8066 8564 9041 9518 9995 980471 0946 1421 1885 2369 2848	5255 5736 6216 6697 7176 7655 8134 8612 9089 9566 0042 0518 0994 1469 1943 2417	5908 5784 6265 6745 77224 7708 8181 8659 9187 9614 0090 0566 1041	5351 5832 6313 6793 7272 7751 8229 8707 9185 9661	5899 5880 6861 6840 7320 7799 8277 8755 9282 9709	5447 5928 6409 6888 7368 7847 8325 8803 9280	5495 5976 6457 6936 7416 7894 8878 8850 9328	5548 6024 6505 6984 7464 7942 8421 8898	5592 6072 6558 7082 7512 7990 8468 8946	5640 6120 6601 7080 7559 8038 8516 8994	48
8 4 5 6 7 8 9 9 10 1 2 8 4 5 6 7	5688 6168 6649 7128 7607 8066 8564 9041 9518 9995 960471 0846 1421 1885 2369 2848	5736 6216 6697 7176 7655 8134 8612 9089 9566 0042 0518 0994 1469 1943 2417	5784 6265 6745 7224 7708 8181 8659 9137 9614 0090 0566 1041	5832 6313 6793 7272 7751 8229 8707 9185 9661	5880 6361 6840 7320 7799 8277 8755 9282 9709	5928 6409 6888 7368 7847 8325 8803 9280	5976 6457 6936 7416 7894 8878 8850 9328	6024 6505 6984 7464 7942 8421 8898	6072 6558 7082 7512 7990 8468 8946	6120 6601 7080 7559 8038 8516 8994	46
4 5 6 7 8 9 910 1 2 8 4 5 6 7	6168 6649 7128 7607 8066 8564 9041 9518 9995 960471 0946 1421 1895 2369 2848	6216 6697 7176 7655 8134 8612 9089 9566 0042 0518 0994 1469 1943 2417	6265 6745 7224 7708 8181 8659 9187 9614 0090 0566 1041	6813 6798 7272 7751 8229 8707 9185 9661	6361 6840 7320 7799 8277 8755 9232 9709	6409 6888 7368 7847 8325 8803 9280	6457 6936 7416 7894 8878 8850 9328	6505 6984 7464 7942 8421 8898	6558 7082 7512 7990 8468 8946	6601 7060 7559 8088 8516 8994	46
5 6 7 8 9 9 10 1 2 3 4 5 6 7	9649 7128 7607 8086 8564 9041 9518 9995 960471 0946 1421 1896 2369 2845	6697 7176 7655 8134 8612 9089 9566 0042 0518 0994 1469 1943 2417	6745 7224 7708 8181 8659 9137 9614 0090 0566 1041	6798 7272 7751 8229 8707 9185 9661	6840 7320 7799 8277 8755 9232 9709	6888 7368 7847 8325 8803 9280	6986 7416 7894 8878 8850 9328	6984 7464 7942 8421 8898	7082 7512 7990 8468 8946	7080 7559 8088 8516 8994	46
6 7 8 9 9 10 1 2 3 4 5 6 7	7128 7607 8086 8564 9041 9518 9995 960471 0946 1421 1895 2389 2848	7176 7655 8134 8612 9089 9566 0042 0518 0994 1469 1948 2417	7224 7708 8181 8659 9187 9614 0090 0566 1041	7272 7751 8229 8707 9185 9661	7820 7799 8277 8755 9282 9709	7368 7847 8325 8803 9280	7416 7894 8373 8850 9328	7464 7942 8421 8898	7512 7990 8468 8946	7559 8088 8516 8994	
7 8 9 910 1 2 8 4 5 6 7	7607 8086 8564 9041 9518 9995 960471 0946 1421 1895 2369 2845	7655 8134 8612 9089 9566 0042 0518 0994 1469 1943 2417	7708 8181 8659 9187 9614 0090 0566 1041	7751 8229 8707 9185 9661 0138	7799 8277 8755 9282 9709	7847 8325 8803 9280	7894 8878 8850 9328	7942 8421 8898	7990 8468 8946	8088 8516 8994	
8 9 9 10 1 2 3 4 5 6 7	9086 8564 9041 9518 9995 960471 0946 1421 1895 2369 2848	8134 8612 9089 9566 0042 0518 0994 1469 1943 2417	8181 8659 9187 9614 0090 0566 1041	8229 8707 9185 9661 0138	8277 8755 9282 9709	8325 8803 9280	8373 8850 9328	8898	8468 8946	8516 8994	
910 1 2 8 4 5 6 7	9041 9518 9995 960471 0946 1421 1895 2369 2848	9089 9566 0042 0518 0994 1469 1943 2417	9187 9614 0090 0566 1041	9185 9661 0188	9232 9709	9280	9328				
1 2 8 4 5 6 7	960471 9996 960471 0946 1421 1895 2369 2848	9566 0042 0518 0994 1469 1948 2417	9614 0090 0566 1041	9661 0188	9709			0.375	0.499	0.4774	ı
2 8 4 5 6 7	9995 960471 0946 1421 1895 2369 2848	0042 0518 0994 1469 1948 2417	0090 0566 1041	0188		9757	l ONANA				I
8 4 5 6 7	960471 0946 1421 1895 2369 2848	0518 0994 1469 1948 2417	0566 1041		0105		300/±	9852	9900	9947	
4 5 6 7	0946 1421 1895 2369 2848	0994 1469 1948 9417	1041	0613	0185	0233	0280	0328	0376	0428	1
5 6 7	1421 1895 2369 2848	1469 1948 2417			0661	0709	0756	0804	0851	0899	
6	1895 2369 2848	1948 2417		1089	1136	1184	1231	1279	1326	1374	1
7	2369 2848	2417	1516	1563	1611	1658	1706	1753	1801	1848	l
	2845		1990	2038	2085	2182	2180	2227 2701	2275	2822 2795	1
		2890	2464 2987	2511 2985	2559	2606 3079	2653 3126	8174	3221	8268	1
8		8363	8410	3457	3504	8552	3599	3646	3698	3741	
920	3788	3835	3882	8929	3977	4024	4071	4118	4165	4212	l
1	4260	4807	4354	4401	4448	4495	4542	4590	4637	4684	l
2	4731	4778	4825	4872	4919	4966	5018	5061	5108	5155	l
8	5202	5249	5296	5343	5390	5437	5484	5581	5578	5625	l
4	5672	5719	5766	5813	5860	5907	5954	6001	6048	6095	#
5	6142	6189	6236	6283	6329	6376	6428	6470	6517	6564	l
6	6611	6658	6705	6752	6799	6845	6892	6939	6996	7083	1
8	7080	7127	7173	7220 7688	7267	7814	7361	7408	7454 7922	7501 7969	l
9	7548 8016	7595 8062	7642 8109	8156	8208	7782 8249	7829 8296	7875 8343	8390	8436	ŀ
930	8483	8530	8576	8623	8670	8716	8763	8810	8856	8908	
ĭ	8950	8996	9043	9090	9136	9183	9229	9276	9323	9369	l
ž	9416	9463	9509	9556	9602	9649	9695	9742	9789	9835	1
8	9882	9928	9975	l 		 					ŀ
4	970347	0393	0440	0021 0486	0068 0533	0114	0161 0626	0207 0672	0254 0719	0300	1
5	0812	0858	0904	0951	0997	1044	1090	1187	1183	1229	
6	1276	1322	1369	1415	1461	1508	1554	1601	1647	1698	ł
7	1740	1786	1832	1879	1925	1971	2018	2064	2110	2157	ĺ
8	2208	2249	2295	2842	2388	2434	2481	2527	2578	2619	t
9	2666	2712	2758	2804	2851	2897	2943	2989	3035	8082	
940	8128	8174	8220	8266	8313	8359	3405	8451	8497	8543	
1)	3590	8636	3682	8728	3774	8820	8866	8918	8959	4005	l
2	4051	4097	4148	4189	4235	4281	4827 4788	4374 4834	4420 4880	4466 4926	!
8	4512 4972	4558 5018	4604 5064	4650 5110	4696 5156	4742 5202	5248	4884 5294	5840	5886	46
-	20.00	3010	2002	3113	""			J /			
	1 . 1		1			nal Pa	1			_	
Diff.	1		-		4	5	. 6	_ _	7	8	9
47 46	4.7	9.4 9.2	14 18		18.8 18.4	28.5 28.0	28.2 27.6		2.9	87.6 86.8	42.

	945 L. 97	0.]									L. 995
N.	0	1	2	8	4	5	6	7	8	9	Diff.
945	975432	5478	5524	5570	5616	5662	5707	5753	5799	5845	
6	5891	5937	5983	6029	6075	6121	6167	6212	6258	6304	
7	6350	6896	6442	6488	6533	6579	6625	6671	6717	6763	
8	6808	6854	6900	6946	6992	7037	7083	7129	7175	7220	
9	7266	7312	7358	7403	7449	7495	7541	7586	7632	7678	
250	7724	7769	7815	7861	7906	7952	7998	8043	8089	8135	
1	8181	8226	8272	8317	8363	8409	8454	8500	8546	8591	
2	8637	8683	8728	8774	8819	8865	8911	8956	9002	9047	
8	9093	9138	9184	9230	9275	9321	9366	9412	9457	9503	
4	9548	9594	9639	9685	9730	9776	9821	9867	9912	9958	
	980003	0049	0094	0140	0185	0231	0276	0322	0367	0412	
5	(458	0503	0549	0594	0640	0685	0730	0776	0821	0867	
7	0912	0957	1003	1048	1093	1139	1184	1229	1275	1320	
8	1366	1411	1456	1501	1547	1592	1637	1683	1728	1773	
ğ	1819	1864	1909	1954	2000	2045	2090	2135	2181	2226	
-						1		l	2633		
60	2271 2723	2316 2769	2362 2814	2407	2452	2497 2949	2543 2994	2588 3040	3085	2678 3130	
1	3175	3220	3265	2859 3310	2904 3356	3401	3446	3040 3491	3536	3581	l
2	3626	3671	3716	3762	3807	3852	3897	3942	3987	4032	
4	4077	4122	4167	4212	4257	4302	4347	4392	4437	4482	
5	4527	4572	4617	4662	4707	4752	4797	4842	4887	4932	45
6	4977	5022	5067	5112	5157	5202	5247	5292.	5337	5382	
7	5426	5471	5516	5561	5606	5651	5696	5741	5786	5830	ļ
8	5875	5920	5965	6010	6055	6100	6144	6189	6234	6279	
ğ	6324	6369	6413	6458	6503	6548	6593	6637	6682	6727	
	ermo					6996	7040	7085	7130	7175	
770	6772	6817 7264	6861 7309	6906 7353	6951 7398	7443	7488	7590	7577	7622	
1	7219 7666	7711		7800	7845	7890	7934	7532 7979	8024	8068	
3	8113	8157	7756 8202	8247	8291	8336	8381	8425	8470	8514	1
4	8559	8604	8648	8693	8737	8782	8826	8871	8916	8960	
5	9005	9049	9094	9138	9183	9227	9272	9316	9361	9405	
6	9450	9494	9539	9583	9628	9672	9717	9761	9806	9850	
7	9895	9939	9983								
,				0028	0072	0117	0161	0206	0250	0294	
8	990339	0383	0428	0472	0516	0561	0605	0650	0694	0738	
9	0783	0827	0871	0916	0960	1004	1049	1098	1137	1182	
180	1226	1270	1315	1359	1403	1448	1492	1536	1580	1625	
~ĭ	1669	1713	1758	1802	1846	1890	1935	1979	2023	2067	
2	2111	2156	2200	2244	2288	2333	2377	2421	2465	2509	
ã	2554	2598	2642	2686	2730	2774	2819	2863	2907	2951	l
4	2995	3039	3083	3127	3172	3216	3260	3304	3348	3392	
5	3436	3480	3524	3568	3613	3657	3701	8745	3789	8833	
6	3877	3921	3965	4009	4053	4097	4141	4185	4229	4273	١
7	4317	4361	4405	4449	4493	4537	4581	4625	4669	4713	44
8	4757	4801	4845	4889	4933	4977	5021	5065	5108	5152	
9	5196	5240	5284	5328	5372	5416	5460	5504	5547	5591	
		'		Pro	PORTIO	nal Pa	RTS,				
Diff	. 1	2	8	3	4	5	6		7	8	9
	-		-¦	-	-			-	-		
46	4.6	9.2	13	.8	18.4	23.0	27.6	32	2.2	36.8	41.
45	4.5	9.0	13	.5	18.0	22.5	27.0) 81	.5	86.0	40.
44	4.4	8.8	13	2	17.6	22.0	26.4		0.8		00.
	4.3	8.6	12		17.2	21.5	25.8		0.1	35.2	39.€

No.	990 L. 99	5.]							[N	o. 999	L. 9 99
N.	0	1	2	8	4	5	6	7	8	9	Diff.
990	995635	5679	5723	5767	5811	5854	5898	5942	5986	6030	
ĭ	6074	6117	6161	6205	6249	6293	6337	6380	6424	6468	44
2	6512	6555	6599	6643	6687	6731	6774	6818	6862	6906	
2	6949	6993	7037	7080	7124	7168	7212	7255	7299	7343	1
4	7386	7430	7474	7517	7561	7605	7648	7692	7736	7779	1
5	7823	7867	7910	7954	7998	8041	8085	8129	8172	8216	
6	8259	8303	8347	8390	8434	8477	8521	8564	8608	8652	1
7	8695	8739	8782	8826	8869	8913	8956	9000	9043	9087	
8	9181	9174	9218	9261	9305	9348	9392	9435	9479	9522	1
9	9565	9609	9652	9696	9789	9783	9826	9870	9918	9957	4.

LOGARITHMS OF NUMBERS FROM 1 TO 100.

N.	Log.	N.	Log.	N.	Log.	N.	Log.	N.	Log.
1 2 3 4 5	0.000000 0.301030 0.477121 0.602060 0.698970	21 22 23 24 25	1.822219 1.342428 1.361728 1.380211 1.397940	41 42 43 44 45	1.612784 1.623249 1.633468 1.643453 1.653213	61 62 63 64 65	1.785830 1.792392 1.799341 1.806180 1.812918	81 82 83 84 85	1.908485 1.913814 1.919078 1.924279
6 7 8 9	0.778151 0.845098 0.903090 0.954243 1.000000	26 27 28 29 30	1.414973 1.431364 1.447158 1.462398 1.477121	46 47 48 49 50	1.662758 1.672098 1.681241 1.690196 1.698970	66 67 68 69 70	1.819544 1.826075 1.832509 1.838849 1.845098	86 87 88 89 90	1.929419 1.934498 1.939519 1.944483 1.949390 1.954243
11 12 18 14 15	1.041393 1.079181 1.113943 1.146128 1.176091	31 82 83 84 85	1.491362 1.505150 1.518514 1.531479 1.544068	51 52 53 54 55	1.707570 1.716003 1.724276 1.732394 1.740363	71 72 73 74 75	1.851258 1.857332 1.863323 1.869232 1.875061	91 92 93 94 95	1.959041 1.963788 1.968483 1.973128 1.977724
16 17 18 19 20	1.204120 1.230449 1.255273 1.278754 1.301030	86 37 38 39 40	1.556303 1.568202 1.579784 1.591065 1.602060	56 57 58 59 60	1.748188 1.755875 1.763428 1.770852 1.778151	76 77 78 79 80	1.880814 1.886491 1.892095 1.897627 1.903090	96 97 98 99 100	1.982271 1.986772 1.991226 1.995635 2.000000
		-				"		-50	2.00000

	Value at 0°.	Sign in 1st Quad.	Value at 90°.	Sign in 2d Quad.	Value at 180°.	Sign in 3d Quad.	Value at 270°	Sign in 4th Quad.	Value at 860°.
Sin	0020288	+++++	R 8 8 R O O R	+11+11+	O O R 2 R 8 8	. 1+1+1+1	R 8 8 R O O R	++	OOR OR & &

R signifies equal to rad; ϖ signifies infinite; O signifies evanescent.

89-

0 60 190 180 240 800 360 420 480 540 600 660 720	0 1 2 8 4 5 6 7 8 9 10	Inf. neg. 6.463726 .764756 6.940847 7.065786 .162696 .241877 .308824	4.6 575 575 575 575 575 575 575	575 575 575 575 575 575	Inf. neg. 6.468726 .764756	Inf. pos. 13.536274	15,814 425 425		ten	60
60 120 180 240 800 360 420 480 540 660	1 2 8 4 5 6 7 8 9	6.468726 .764756 6.940847 7.065786 .162696 .241877	575 575 575 575 575 575 575	575 575 575 575	6.468726 .764756	Inf. pos. 13.536274	425			60
190 180 240 900 180 120 120 1480 540 600	28 4 5 6 7 8 9	6.468726 .764756 6.940847 7.065786 .162696 .241877	575 575 575 575	575 575	.764756	13.536274	495		+	154
180 240 360 360 420 480 540 560	8 4 5 6 7 8 9	.764756 6.940847 7.065786 .162696 .241877	575 575 575 575	575					ten.	
240 900 960 420 480 540 600	4 5 6 7 8 9	6.940847 7.065786 .162696 .241877	575 575			.235244	425	i I	ten	56
240 260 280 220 480 540 560	5 6 7 8 9	.162696 .241877	575 575		6.940847	18.059158	425	1	ten	57
900 960 120 180 540 600	5 6 7 8 9	.162696 .241877	575		7.065786	12.934214	425	i I	ten	56
360 420 480 540 600 660	7 8 9			575	.162696	.837304	425	امما	ten	54
180 540 500 860	8	.308824	575	575	.241878	.758122	425	.02	9.999999	54
540 500 560	9		575	575	.308825	.691175	425	.00	.999999	5
600 660		.366816	574	576	.366817	.638183	424	.00	.999999	55
860	10	.417968	574	576	.417970	.582030	424	.00	.999999	5
		.463726	574	576	.463727	.536273	424	.02	.999998	5
	11	7.505118	574	576	7.505120	12.494880	424	.00	9.999998	4
	12	.542906	574	577	.542909	.457091	423	.02	.999997	4
780	18	.577668	574	577	.577672	.422328	423	.00	.999997	4
840	14	.609853	574	577	.609857	.390143	423	.02	.999996	4
900	15	.639816	573	578	.639820	360180	422	00.	.999996	4
960	16	.667845	573	578	.667849	.332151	422	.02	.999995	4
020	17	.694173	573	578	.694179	.305821	422	.00	.999995	4
080	18	718997	573	579	.719003	280997	421	.02	.999994	4
140	19	.742478	578	579	742484	.257516	421	.02	.999993	4
200	20	.764754	572	580	.764761	.235239	420	.00	.999998	4
			1.77	1000				.02		1 -
260	21	7.785948	572	580	7.785951	12.214049	420	.02	9.999992	8
320	22	.806146	572	581	.806155	.193845	419	.02	.999991	8
380	23	.825451	572	581	.825460	.174540	419	.02	.999990	3
440	24	.843934	571	582	.843944	.156056	418	.00	.999989	8
500	25	.861662	571	583	.861674	.138326	417	.02	.999989	3
560	26	.878695	571	583	.878708	.121292	417	l na	.999988	8
620	27	.895085	570	584	.895099	.104901	416	.02	999987	8
680	28	.910879	570	584	.910894	.089106	416	.02	.999986	8
740	29	.926119	570	585 586	.926134	.073866	415	.03	.999985	3
800	30	.940842	569	11	.940858	.059142	414		.999983	1 -
860	31	7.955082	569	587	7.955100	12.044900	413	.02	9.999982	2
920	32	.968870	569	587	.968889	.031111	418	.02	.999981	2
980	33	.982233	568	588	.982253	.017747	412	.02	999980	2
040	34	7.995198	568	589	7.995219	12.004781	411	.08	.999979	2
2100	35	8.007787 .020021	567	590	8.007809	11.992191	410	.02	.999977	2
160	36	.020021	567	591	.020044	.979956	409	.02	.999976	2
2220	35 36 37 38	.031919	566	592	.031945	.968055	408	.03	.999975	2
280	38	.043501	566	593	.043527	.956478	407	.02	.999973	2
340	39	.054781	566	593	.054809	.945191	407	.02	.999972	2
400	40	.065776	565	594	.065806	.934194	406	11	.999971	2
460	41	8.076500	565	595	8.076531	11.923469	405	.08	9,999969	1
520	42	.086965	564	596	.086997	.913003	404	.02	999968	11
580	43	.097188	564	598	.097217	.902783	402	.08	,999966	١ī
640	44	.107167	563	599	.107208	.892797	401	.08	.999964	i
700	45	.116926	562	600	.116963	.883037	400	.02	.999968	ī
760	46	.126471	562	601	.126510	.878490	899	,08	.999961	1
820	47	.185810	561	602	.135851	.864149	898	.08	.999959	1
880	48	.144958	561	603	.144996	.855004	897	.02	.999958	1
940	49	.153907	560	604	.153952	.846048	896	.03	999956	1
000	50	.162681	560	605	.162727	.837273	895	.08	999954	1
060	51	8.171280	559	607	8.171328	11.828672	893	.08	9.999952	1
120	52	.179718	558	608	.179763	.820237	392	.08	.999950	1
180	53	.187985	558	609	.188036	.811964	891	.03	.999948	
240	54	.196102	557	611	.196156	.808844	889	.08	999946	
300	55	.204070	556	612	.204126	.795874	888	.08	000044	
360	56	.211895	556	613	.211958	.788047	387	.08	999942	1
120	57	.219581	555	615	.219641	.780859	385	.08	999940	
480	58	.227134	554	616	.227195	772805	884	80.	999988	1.
540	50	.284557	554	618	234621	.765379	882	.08	.999986	1
600	59 60	8.241855	553	619	8.241921	11.758079	381	.03	9.999994	1
	1	1 3		085			15.814	11		1
	1	1	-			l l	1	11	1	1

1.		TABLE X.—		-LOGARI	THMIC S	INES,			178*	
"		Sine.	q -	- 1	Tang.	Cotang.	q+l	D1'	Cosine.	•
			4.6	85			15.814			- I
3600	ci	8.241855	553	619	8.241921	11.758079	381	ا ۔۔ ا	9.999934	60
3660	C	.249088	552	620	.249102	.750898	380	.05	.999932	59
8720	8	.256094	551	622	.256165	.743885	378	.03	.999929	58
8780 8840	3	.263042 .269881	551	623 625	.268115	.736885	877	.03	.999927	57
8900	4 5	.276614	550 549	627	.269956 .276691	.730044 .723309	375 373	.05	.999925 .999922	56 55
3960	6	.288243	548	628	.283323	.716677	372	.09	.999920	54
4020	7	.289773	547	630	.289856	.710144	370	.08	.999918	58
4080	8	.296207	546	632	.296292	.703708	368	.05	.999915	52
4140 4200	9	. 302546	546	638	.302634	.697366	367	.05	.999918	51
	10	.808794	545	685	.808884	.691116	365	.05	.999910	50
4260	11	8.814954	544	687	8.815046	11.684954	363	.03	9.999907	49
4320 4380	12 18	.821027 .827016	548 542	688 640	.821122 .827114	.678878 .672886	362 360	.05	.999905	48
4440	14	.882924	541	642	.883025	666975	358	.05	.999899	46
4500	15	.888758	540	644	.338856	.661144	356	.03	.999897	45
4560	16	.844504	540 589	646	.844610	.655890	354	.05 .05	.999894	44
4620	17	.850181	589	648	.850289	.649711	352	.05	.999891	48
4680 4740	18 19	.855788 .861815	588	649 651	.855895 .861430	.638570	351 349	.05	.999888	42
4800	20	.866777	586	658	.866895	.633105	347	.05	.999882	40
4860		8.372171	585					.05		89
4920	21 22	.877499	584	655 657	8.372292 .877622	11.627708 .622878	345 343	.05	9.999879 .999876	38
4980	28	.882762	533	659	382889	.617111	841	.05	.999878	37
5040	24 25	.887962	532	661	.888092	.611908	839	.05	.999870	36
5100	25	.893101	581	668	.898284	.606766	337	.05	.999867	85
5160 5220	26 27	.898179 .408199	530	666	.898815	.601685	834	.05	.999864	84
5280	28	.408161	529 527	668	.408888 .408304	.596662 .591696	832 830	.05	.999861 .999858	33
5340	29	.413068	526	672	413218	.586787	828	.07	.999854	31
5400	80	.417919	525	674	.418068	.581982	826	.05	.999851	30
5460	81	8.422717	524	676	8.422869	11.577181	324	.05	9.999848	29
5520	82	.427462	523	679	.427618	.572882	821	.07	.999844	28
5580	88	.482156	522	681	.482815	.567685	319	.05	.999841	27
5640 5700	84 85	.486800 .441894	521 520	688 685	.486962 .441560	.568088 .558440	817 315	.07	.999838 .999834	26 25
5760	86	.445941	518	688	.446110	.558890	812	.05	.999831	24
5820	87	.450440	517	690	.450618	.549887	310	.07	.999827	28
5880	88	.454898	516	698	.455070	.544980	307	.05	.999824	22
5940 6000	89 40	.459801	515	695 697	.459481	.540519	305 308	.07	.999820	21
1		.463665	514		.463849	.586151	1	.05	.999816	20
6060	41 42	8.467985	512	700	8.468172	11.531828	800	.07	9.999813	19
6190 6180	43	.472268 .476496	511 510	702 705	.472454 .476698	.527546 .528307	298 295	.07	.999809 .999805	18 17
6240	44	.480698	509	707	480892	.519108	293	.07	.999801	16
6300	45	484848	507	710	.485050	.514950	290	.07 .05	.999797	15
6860	46	.488968	506	718	.489170	.510880	287	.07	.999794	14
6420 6480	47	.498040	505 508	715	.493250 .497293	.506750 .502707	285 282	.07	.999790 :999786	18 12
6540	49	.501080	502	718	.501298	.498702	280	.07	.999782	11
6600	50	.505045	501	720 728	.505267	.494733	277	.07	.999778	10
6660	51	8.508974	499	726	8.509200	11.490800	274	.07	9.999774	9
6720	52	.512867	498	729	.518098	.486902	271	.08	.999769	
6780	53	.516726	497	781	.516961	.483089	269	.07	.999765	8 7
6840	54	.520551	495	784	.520790	.479210	266	.07	.999761	6
6900 6960	55 56	.524848 .528102	494 492	787	524586 .528849	.475414 .471651	263 260	.07	.999757 .999753	5
7020	57	.581828	491	748	.582080	.467920	257	.08	.999748	8
7080	58	.585528	490	745	.585779	.464221	255	.07	.999744	2 1
7140	59	.539186	488	748	.589447	.460558	252	.06	.999740	1
7200	60	8.542819	487	751	8,543084	11.456916	249 15.814	11 ~	9.999735	0
l			4.685			1	J.W. 014	11	· .	
	 		<u> </u>	 -	G-4			-	- Ole -	 ,
//	ı '	Cosine.	q ·	- l	Cotang.	Tang.	q+l	D1	Sine.	ı'i

91.

Z°			<u> </u>					177
,	Sine.	D. 1*.	Cosine.	D. 1".	Tang.	D. 1".	Cotang.	1.
-	8 542319		9.999735		8.543094		11.456916	60
Ιĭ	.546422	60.05	.999731	.07	.546691	60.12	.453309	59
ĺĝ	.549995	59.55	999726	.08	.550268	59.62	.449732	58
2 3	.553539	59.07 58.58	.999722	.07	.558817	59.15 58.65	.446183	57
4	.557054	58.10	.999717	.07	.557336	58.20	.442664	56
5	.560540	57.65	.999713	.08	.560828	57.72	.439172	55
6	.563999	57.20	.999708	.07	.564291	57.27	435709	54
7	.567431	56.75	.999704	.08	.567727	56.88	.432273	58
8	.570836	56.30	.999699 .999694	.08	.571187	56.88	.428863 .425480	52
9 10	.574214	55.87	999689	.08	.577877	55.95	.422123	51 50
		55.43	100000	.07	11	55.52		1
11	8.580892	55.02	9.999685	.08	8.581208	55.10	11.418792	49
12	.584198	54.60	.999680	.08	.584514	54.68	.415486	48
18	.587469	54.20	.999675	.08	.587795	54.27	.412205	47
14	.590721	58.78	.999670	.08	.591051	53.87	.408949	46
15 16	.597152	58.40	.999660	.08	.597492	58.48	.405717 .402508	45
17	.600332	58.00	999655	.08	.600677	53.08	399323	43
18	.603489	52.62	.999650	.08	.603839	52.70	.396161	42
19	.606623	52.23	.999645	.08	.606978	52.82	393022	41
20	.609734	51.85	.999640	.08	.610094	51.98	.389906	40
21	8.612823	51.48	9.999635	.08	8.613189	51.58	11.886811	39
22	.615891	51.18	.999629	.10	.616262	51.22	.383738	38
23	.618937	50.77	.999624	.08	.619318	50.85	.380687	37
24	.621962	50.42	.999619	.08	.622343	50.50	.877657	36
25	.624965	50.05	.999614	.08	.625352	50.15	.374648	35
26	.627948	49.72 49.38	.999608	.10	.628340	49.80	871660	34
27	.630911	49.35	.999603	.08	.681808	49.47	.368692	33
28	.633854	49.05 48.70	.999597	.08	.634256	49.18 48.80	.365744	32
29	.636776	48.40	.999592	.10	.687184	48.48	.362816	81
30	.639680	48.05	.999586	.08	.640098	48.15	.359907	30
81	8.642563	47.75	9.999581	.10	8.642982	47.85	11.357018	29
82	.645428	47.48	.999575	.08	.645858	47.52	.854147	23
33	.648274	47.18	.999570	.10	.648704	47.22	.851296	27
34	.651102	46.82	.999564	.1ŏ	.651537	46.92	.848468	26
35	.653911	46.52	.999558	.08	.654352	46.62	.845648	25
36 37	.656702 .659475	46.22	.999547	.10	.659928	46.82	.342851 .340072	24 23
88	.662230	45.92	.999541	.10	.662689	46.02	.837311	22
89	.664968	45.63	.999535	.10	.665488	45.73	.334567	21
40	.667689	45.85	.999529	.10	.668160	45.45	331840	20
	1	45.07		.08	11	45.17	1	
41 42	8.670393 .673080	44.78	9.999524 .999518	.10	8.670870 .673568	44.88	11.329130 .326437	19 18
43	.675751	44.52	.999512	.10	.676239	44.60	.323761	17
44	.678405	44.23	.999506	.10	.678900	44.85	.321100	16
45	.681048	43.97	.999500	.10	.681544	44.07	.818456	15
46	.683665	43.70	.999493	.12	.684172	43.80	.815828	14
47	.686272	43.45 43.18	.999487	.10 .10	.686784	43.58 43.28	.313216	13
48	.688863	42.92	.999481	.10	.689381	43.03	.310619	12
49	.691438	42.67	.999475	.10	.691968	42.77	.309037	11
50	.693998	42.42	.999469	.10	.694529	42.53	.805471	10
51	8.696543	42.17	9.999463	.12	8.697081	42.27	11.302919	9
52	.699073	41.93	.999456	.10	.699617	42.03	.300883	8
53	.701589	41.68	.999450	.12	.702139	41.78	.297861	7
54	.704090	41.45	.999443	.10	.704646	41.57	.295354	6
55	.706577	41.20	.999487	.10	.707140	41.80	.292860	5
56 57	709049	40.97	.999431	.12	.709618	41.08	.290888	3
58	.711507 .713952	40.75	.999424 .999418	.10	.712088 .714584	40.85	.287917 .285466	9
59	.716383	40.52	.999411	.12	.716972	40.68	283028	2 1
60	8.718800	40.28	9.999404	.12	8.719896	40.40	11.280604	ō
	Cogine.	D. 1'.	Sine.	D. 1'.	Cotang.	D. 1°.	Tang.	-
			~·		, 500000		~ ,	1

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,	Sine.	D. 1.	Cosine.	D. 1'.	Tang.	D. 1*.	Cotang.	,
-	8,718900		9.999404		8.719396		11.290604	60
Ĭ	721204	40.07	.999898	.10	721806	40.17	.278194	59
2	.798595	89.85	.999391	.12	.724204	39.97 39.73	.275796	58
8	.725973	39.62 39.42	.999384	.12 .10	.726588	39.52	.278412	57
4	.728337	89.18	.999378	.12	.728959	89.80	.271041	56
5	.730688	88,98	.999871	12	.781317	89.10	.268683	55
6	.733027	38.78	.999864	.12	.733663 .785996	88.88	.266337 .264004	54
8	.785854	38.55	999850	.12	.738317	88.68	.261683	58 52
l s	739969	38.37	.999848	.12	.740626	88.48	.259374	51
10	742259	38.17	.999336	.12	742922	88.27	.257078	50
		87.95	1	.12	13	88.08	1	
11 12	8.744536 .746802	87.77	9.999329	.12	8.745207 .747479	37.87	11.254793 252521	49 48
18	.749055	87.55	.999815	.12	749740	87.68	.250260	47
14	.751297	37.37	.999308	.12	.751989	87.48	.248011	46
15	.758528	87.18	.999801	.12	.754227	87.30	.245773	45
16	.755747	36.98 36.80	.999294	.12 .12	.756453	37.10 36.92	.243547	44
17	.757955	86.60	.999287	.13	.758668	36.78	.241832	43
18	.760151	36.48	.999279	.13	.760872	36.55	.239128	42
19	.762337	36.23	.999272	.12	.763065	36.35	.236935	41
20	.764511	36.07	.999265	.13	.765246	36.18	.234754	40
21	8.766675	35.88	9.999257	.12	8.767417	36.02	11.232583	39
22	.768828	35.70	.999250	.13	.769578	85.82	.230422	38
23	.770970	85.52	.999242	.12	.771727	85.65	.228278	371
24	.773101	85.87	.999235	.13	.773866	35.48	.226134	36
25 26	.775228	85.17	.999220	.12	.775995 .778114	35.32	.224005 .221886	35 34
27	.779484	35.02	.999212	.18	.780222	35.18	.219778	33
28	.781524	34.88	.999205	.12	.782320	84.97	.217680	82
29	.783605	84.68	.999197	.18	.784408	84.80	.215592	81
80	.785675	34.50 34.35	.999189	.13 .13	.786486	84.63 84.47	.213514	80
81	8.787736		9.999181		8.788554		11.211446	29
82	.789787	34.18	.999174	.12	.790613	34.32	.209387	28
88	.791828	34.02 33.85	.999166	.13 .13	.792662	34.15 33.98	.207338	27
84	.793859	83.70	.999158	.13	.794701	33.83	.205299	26
35	.795881	83.55	.999150	.13	.796731 .798752	83.68	.203269	25
86	.797894	83.38	.999142	.13	.798752	83.52	.201248	24
37 38	.799897 .801892	83.25	.999134 .999126	.13	.800763 .802765	83.87	.199237 .197235	28 22
89	.808876	33.07	.999118	.13	.804758	83.22	.195242	21
40	.805852	82.93	.999110	.13	.806742	83.07	.193258	20
41	8.807819	32.78	9.999102	.13	8.808717	82.92	11.191283	19
42	.809777	82.63	.999094	.13	.810683	32.T 32.63	.189317	18
43	.811726	82.48	.999086	.13	.812641	82.63	.187359	17
44	.813667	82.85	.999077	.15 .13	.814589	82.47 82.33	.185411	16
45	.815599	82.20 82.05	.999069	.18	.816529	82.33 82.20	.183471	15
46	.817522	81.90	.999061	.13	.818461	32.05	.181539	14
47	.819486	31.78	.999053	.15	.820384	31.90	.179616	13
48	.821348	31.69	.999044	.13	.822298 .824205	31.78	.177702	12
49 50	.823240 .825180	81.50	.999027	.15	.826103	81.63	.175795 .173897	11 10
51	8.827011	81.85	9.999019	.13	8.827992	31.48	11.172008	9
52	.828884	81.22	.999010	.15	.829874	31.37	.170126	8
58	.830749	31.08 30.97	.999002	.13 .15	.831748	31.23 31.08	.168252	7
54	.832607	30.82	.998993	.15	.833613	30.97	.166387	6
55	.884456	30.68	.998984	.13	.835471	30.83	.164529	5
56	.836297	30.55	.998976	.15	.837321	80.70	.162679	4
57	.838130 .839956	30.43	.998967 .998958	.15	.839163 .840998	30.58	.160837 .159002	8
50	.841774	80.30	.998950	.18	.842825	80.45	.157175	ĩ
58 59 60	8.848585	30.18	9.998941	.15	8.844644	30.32	11.155356	ō
-	Cosine.	D 1'.	Sine.	D. 1'.		D. 1'.		÷۱
	COSING,	ו.וע	i bine. I	<i>D</i> . 1 . 1	Cotang.	<i>υ</i> . ι	Tang.	

4			<u>, </u>					175
,	Sine.	D. 1'.	Cosine.	D. 1*.	Tang.	D. 1'.	Cotang.	
0	8.843585	90.00	9.998941		8.844644	20.10	11.155356	60
1	.845387	80.03 29.93	.998932	.15 .15	.846455	30.18 30.08	. 153545	59
2	.847183	29.80	.998923	.15	.848260	29.95	.151740	58
3 4	.848971	29.67	.998914	.15	.850057	29.82	.149943	57
5	.850751 .852525	29.57	.998905 .998896	.15	.851846 .853628	29.70	.148154 .146372	56 55
6	.854291	29.43	998887	.15	855403	29.58	.144597	54
7	.856049	29.30	.998878	.15	.857171	29.47	.142829	53
8	.857801	29.20 29.08	.998869	.15 .15	.858932	29.35 29.23	.141068	52
9	.859546	28.95	.998860	.15	.860686	29.12	.139314	51
10	.861283	28.85	.998851	.17	.862433	29.00	.137567	50
11	8.863014	28.73	9.998841	.15	8.864173	28.88	11.135827	49
12	.864738	28.62	.998832	.15	.865906	28.77	.134094	48
13	.866455	28.50	.998823	.17	.867632	28.65	.132368	47
14 15	.868165 .869868	28.38	.998813 .998804	.15	.869351 .871064	28.55	.130649 .128936	46 45
16	.871565	28.28	998795	.15	.872770	28.43	.127230	44
17	.878255	28.17	.998785	.17	.874469	28.32	.125531	43
18	.874938	28.05 27.95	.998776	.15	.876162	28.22 28.12	.123838	42
19	.876615	27.83	.998766	.17 .15	.877849	28.00	.122151	41
20	.878285	27.73	.998757	.17	.879529	27.88	.120471	40
21	8.879949	27.68	9.998747		8.881202	27.78	11.118798	39
22	.881607	27.52	.998738	.15 .17	.882869	27.68	.117131	38
23	.883258	27.42	.998728	.17	.884530	27.58	.115470	37
24 25	.884903 .886542	27.32	.998718	.17	.886185	27.47	.118815	36
20 26	.888174	27.20	.998708 .998699	.15	.887833 .889476	27.38	.112167 .110524	35 34
27	.889801	27.12	.998689	.17	.891112	27.27	.108888	33
28	.891421	27.00	998679	.17	.892742	27.17	.107258	82
29	.893035	26.90 26.80	.998669	.17 .17	.894366	27.07 26.97	.105684	81
30	.894643	26.72	.998659	17	.895984	26.87	.104016	30
31	8.896246	26.60	9.998649	.17	8.897596	26.78	11.102404	29
82	.897842	26.50	.998639	.17	.899203	26.67	.100797	28
33	.899432	26.42	.998629	.17	.900803	26.58	.099197	27
84 85	.901017	26.32	.998619 .998609	.17	.902398 .903987	26.48	.097602	26 25
36 86	.904169	26.22	.998599	.17	.905570	26.88	.094430	24
87	.905736	26.12	.998589	.17	.907147	26.28	.092853	23
38	.907297	26.02 25.93	.998578	.18	.908719	26.20 26.10	.091281	22
89	.908853	25.85	.998568	.17 .17	.910285	26.02	.089715	21
40	.910404	25.75	.998558	.17	.911846	25.92	.088154	20
41	8.911949	25.65	9.998548	.18	8.913401	25.83	11.086599	19
42	.913488	25.57	.998537	.17	.914951	25.73	.085049	18
43	.915022	25.47	.998527	.18	.916495	25.63	.083505 .081966	17
44 45	.916550 .918073	25.38	.998516 .998506	.17	.918084 .919568	25.57	.080432	16 15
46	.919591	25.30	.998495	.18	.921096	25.47	.078904	14
47	.921103	25.20	.998485	.17	.922619	25.38 25.28	.077381	13
48	.922610	25.12 25.03	.998474	.18 .17	.924136	25.25	.075864	12
49	.924112	24.95	.998464	.18	.925649	25.12	.074851	11
50	.925609	24.85	.998458	.18	.927156	25.03	.072844	10
51	8.927100	24.78	9.998442	.18	8.928658 .930155	24.95	11.071342 .069845	9
52 53	.928587	24.68	.998431	.17	.931647	24.87	.068353	7
54	.981544	24.60	.998410	.18	.933184	24.78	.066866	6
55	.983015	24.52	.998399	.18	.934616	24.70 24.62	.065384	5
56	.934481	24.43 24.35	.998388	.18 .18	.936093	24.02	.068907	8
57	.935942	24.27	.998377	.18	.987565	24.45	.062435	3
58 59	.937398	24.20	.998366	.18	.939032	24.37	.060968	2
60	.938850 8.940296	24.10	.998855 9.998344	.18	.940494 8.941952	24.30	.059506 11.058048	0
-,	Cosine.	D. 1'.	Sine.	D. 1".	Cotang.	D. 1'.	Tang.	-
			, ~		, 500mm.B.		·	. 1

ł	5°		IADLE	A.—DO	GALLI	HMIC SI	M EG,		17 4°
	′	Sine.	D. 1*.	Cosine.	D. 1*.	Tang.	D. 1'.	Cotang.	•
١	0	8.940296	04.00	9.998344	10	8.941952		11.058048	60
1	1	.941738	24.08 23.93	.998333	.18 .18	.943404	24.20 24.13	.056596	59
ı	2	.943174	23.87	.998322	.18	.944852	24.05	.055148	58
١	8	.944606	23.80	.998311	.18	.946295	23.98	.053705	57
ı	4	.946034	23.70	.998300	.18	.947734	23.90	.052266	56
١	5	.947456 .948874	23.63	.998289	.20	.949168 .950597	23.82	.050832	55 54
ł	7	.950287	23.55	.998266	.18	.952021	23.78	.047979	58
١	8	.951696	23.48	.998255	.18	.953441	23.67	.046559	52
1	ğ	.953100	23.40	.998243	.20	.954856	23.58	.045144	51
1	10	.954499	23.32 23.25	.998232	.18 .20	.956267	23.52 23.45	.043733	50
ı	11	8.955894		9.998220		8.957674		11.042326	49
1	12	.957284	23.17	.998209	.18	.959075	23.35	.040925	48
1	18	.958670	23.10 23.08	.998197	.20 .18	.960473	23.30 23.22	.039527	47
ı	14	.960052	22.95	.998186	.20	.961866	23.15	.038134	46
1	15	.961429	22.87	.998174	.18	.963255	23.07	.036745	45
1	16	.962801	22.82	.998163	.20	.964639	23.00	.035361	44
	17 18	.964170 .965534	22.78	.998151 .998139	.20	.966019 .967394	22.92	.083981 .032606	43 42
1	19	.966893	22.65	.998128	.18	.968766	22.87	.032000	41
	20	.968249	28.60	.998116	.20	.970133	22.78	.029867	40
- 1	1	8.969600	22.52	9.998104	.20	11	22.72		
1	21 22	.970947	22.45	.998092	.20	8.971496 .972855	22.65	11.028504	39
	23	.972289	22.37	.998080	.20	.974209	22.57	.025791	38 37
	24	.973628	22.32	.998068	.20	.975560	22.52	.024440	86
	25	.974962	22.23 22.18	.998056	.20 .20	.976906	22.48 22.37	.023094	35
	26	.976293	22.10	.998044	.20	.978248	22.30	.021752	34
	27	.977619	22.03	.998032	20	.979586	22.25	.020414	88
	28	.978941	21.97	.998020	.20	.980921	22.17	.019079	82
	25 26 27 28 29 30	.980259	21.90	.998008	.20	.982251	22.10	.017749 .016423	81
			21.83		.20	1	22.03		30
	31	8.982883	21.77	9.997984	.20	8.984899	21.97	11.015101	29
1	32 33	.984189	21.72	.997972	.22	.986217	21.92	.013783	28
1	34	.985491 .986789	21.63	.997959 .997947	.20	.987532	21.83	.012468 .011158	27 26
	35	.988083	21.57	.997935	.20	.990149	21.78	.009851	25
1	35 36 87	989374	21.52	.997922	.22	.991451	21.70	.008549	24
	87	.990660	21.48 21.38	.997910	.20	.992750	21.65 21.58	.007250	23
ı	I 885 ∣	.991943	21.32	.997897	.20	.994045	21.53	.005955	22
	39	.993222	21.25	.997885	.22	.995337	21.45	.004663	21
	40	.994497	21.18	.997872	.20	.996624	21.40	.003376	20
1	41	8.995768	21.13	9.997860	.22	8.997908	21.83	11.002092	19
-	42	.997036	21.05	.997847	20	8.999188	21.28	11.000812	18
	43	.998299 8.999560	21.02	.997835 .997822	.22	9.000465	21.22	10.999535	17
	44 45	9.000816	20.93	997809	.22	.003007	21.15	.998262	16 15
	46	.002069	20.88	997797	.20	.004272	21.08	.995728	14
	47	.003318	20.82	.997784	.22	.005534	21.03	.994466	18
ļ	48	.004563	20.75	.997771	.22	.006792	20.97	.993208	12
- 1	49	.005805	20.65	.997758	22	.008047	20.85	.991953	11
- 1	50	.007044	20.57	.997745	22	.009298	20.80	.990702	10
	51	9.008278	20.53	9.997732	.22	9.010546	20.73	10.989454	9
	52	.009510	20.45	.997719	22	.011790	20.68	.988210	8 7 6 5
	53	.010737	20.42	.997706	22	.018031	20.62	.986969	7
	54	.011962	20.83	.997693	1 00	.014268	20.57	.985732	5
-	55 56	.018182	20.30	997680 997667	.22	.015502 .016732	20.50	984498	4
	57	.015613	20.22	997654	.22	.017959	20.45	.982041	8
	58	.016824	20.18	997641	.22	.019183	20.40	.980817	2
i	59	.018031	20.12 20.07	.997628	.22	.020403	20.33 20.28	.979597	1 0
1	60	9.019235		9.997614		9.021620		10.978880	0
ı	•	Cosine.	D. 1'.	Sine.	D. 1".	Cotang.	D. 1'.	Tang.	1

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5°			,					178*
,	Sine.	D. 1.	Cosine.	D. 1*.	Tang.	D. 1'.	Cotang.	,
0	9.019235	20.00	9.997614	.22	9.021620	20.23	10.978880	60
1	.020435	19.95	.997601	.22	.022834	20.17	.977166	59
2 8	.021632	19.88	.997588	,23	.024044	20.12	.975956	58
4	.024016	19,85	.997561	.22	.026455	20.07	.974749 .973545	57
5	.025203	19.78	.997547	.23	.027655	20.00	.972345	56 55
6	.026386	19.72	.997534	.22	.028852	19.95	.971148	54
7	.027567	19.68 19.62	.997520	.23	.030046	19.90	.969954	53
8	.028744	19.57	.997507	.23	.031237	19.85 19.80	.968763	52
9	.029918	19 52	.997493	:22	.032425	19.78	.967575	51
10	.031069	19.47	.997480	.23	.033609	19.70	.966891	50
11	9.032257	19.40	9.997466	.23	9.034791	19.63	10.965209	49
12	.088421	19.35	.997452	.22	.035969	19.58	.964081	48
13	.034582	19.32	.997439	.23	.037144	19.53	.962856	47
14 15	.036896	19.25	.997425	.23	.038316	19.48	.961684	46
16	.038048	19.20	.997411	.23	.039485	19.43	.960515 .959849	45
17	.039197	19.15	.997883	.23	.041818	19.37	.958187	44
18	.040342	19.08	.997369	.23	.042978	19.33	.957027	43 42
19	.041485	19.05	.997855	.23	.044130	19.28	.955870	41
20	. 042625	19.00 18.95	.997341	.23 .23	.045284	19.23 19.17	.954716	40
21	9.043762		9.997827	•	9.046434		10.953566	39
22	.044895	18.88	.997818	.23	.047582	19.13	.952418	
23	.046026	18.85	.997299	.23	.048727	19.08	.951273	38 37
24	.047154	18.80 18.75	.997285	.23 .23	.049869	19.08	.950181	86
25 26	.048279	18.68	.997271	.23	.051008	18.98 18.93	.948992	36 35
26	.049400	18.65	.997257	.25	.052144	18.88	.947856	184 I
27	.050519	18.60	.997242	.23	.053277	18 83	.946723	33
28 29	.051635	18.57	.997228	.23	.054407	18.80	.945593	32
30	.053859	18.50	.997214 .997199	.25	.055535 .056659	18.78 18.70	.944465	81
		18.45		.23	1	18.70	.948841	80
81	9.054966	18.42	9.997185	.25	9.057781	18.65	10.942219	29
32 33	.056071 .057172	18.35	.997170	.23	.058900	18.60	.941100	28
84	.058271	18.32	.997156 .997141	.25	.060016 .061180	18.57	.939984 .938870	27
85	.059367	18.27	.997127	.23	.062240	18.50	.937760	26 25
36	.060460	18.22 18.18	.997112	.25	.063348	18.47	.936652	24
87	.061551	18.18	.997098	.23	.064453	18.49	.935547	23
88	.062639	18.08	.997083	.25 .25	.065556	18.88	.984444	222
39	.063724	18.03	.997068	.25	.066655	18.89 18.28	.933345	21
40	.064806	17.98	.997053	.23	.067752	18.25	. 932248	20
41	9.065885	17.95	9.997089	.25	9.068846		10.931154	19
42	.066962	17.90	.997024	.25 .25	.069938	18.20 18.15	.930062	18
43	.068086	17.85	.997009	.25	.071027	18.10	.928978	17
44 45	.069107	17.82	.996994	.25	.072118	18 07	.927887	16
46 46	.070176 .071242	17.77 17.78	.996979	.25	.078197	18.07 18.02	.926808	15
47	.071242	17.78	.996964 .996949	.25	.074278 .075856	17.97	.925722	14
48	.078366	17.67	.996934	.25	.076482	17.93	.994644 .928568	18
49	.074424	17.68	.996919	.25	.077505	17.88	. 922495	19 11
50	.075480	17.60 17.55	.996904	.25 .25	.078576	17.85	921424	10
51	9.076533		9.996889		9.079644	17.80	10,920856	9
52	.077583	17.50	.996874	.25	.080710	17.77	.919290	8
58	.078631	17.47	.996858	.27	.081773	17.78	.918227	9
54	.079676	17.42 17.88	.996843	.25 .27	.082838	17.67	.917167	6
55	.080719	17.88	.996828	.27	.083891	17.68 17.60	.916109	5
56	.081759	17.30	.996812	.25	.084947	17.55	.915058	4
57	.082797	17.25	.996797	.25	.086000	17.50	.914000	8
58 59	.083832	17.90	.996782	.27	.087050	17.47	.912950	28
60	9.065894	17.17	.996766 9.996751	.25	.088098 9.089144	17.48	.911902	1
~			0.000101		9.009144		10.910856	0
•	Cosine.	D. 1'.	Sine.	D. 1'.	Cotang.	D. 1'.	Tang.	
					. 500000			

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•	Sine.	D. 1*.	Cosine.	D. 1'.	Tang.	D. 1°.	Cotang.	'
0 1 2 3 4 5 6 7 8	9 065894 .086922 .087947 .088970 .089990 .091008 .092024 .093037 .094047	17.13 17.08 17.05 17.00 16.97 16.93 16.88 16.83 16.83	9.996751 .996735 .996720 .996704 .996688 .996873 .996857 .996641	27	9.089144 .090187 .091228 .092266 .093902 .094336 .095367 .096395 .097422	17.38 17.35 17.30 17.27 17.28 17.18 17.18 17.13 17.12 17.07	10.910856 .909813 .908772 .907734 .906698 .905664 .904633 .903605 .902578	60 59 58 57 56 55 54 53 52
10 11 12 13 14	.095056 .096062 9.097065 .098066 .099065 .100062	16.77 16.72 16.68 16.65 16.62	.996510 .996594 9.996578 .996562 .996546 .996530	.27 .27 .27 .27 .27	.098446 .099468 9.100487 .101504 .102519 .108532	17.08 16.98 16.95 16.92 16.88	.901554 .900532 10.899513 .898496 .897481 .896468	51 50 49 48 47 46
15 16 17 18 19 20	.101056 .102048 .108037 .104025 .105010 .105992	16.57 16.53 16.48 16.47 16.42 16.37 16.35	.996514 .996498 .996482 .996465 .996449 .996433	.27 .27 .28 .27 .27	.104542 .105550 .106556 .107559 .108560 .109559	16.88 16.80 16.77 16.72 16.68 16.65 16.62	.895458 .894450 .893444 .892441 .891440 .890441	45 44 43 42 41 40
21 22 23 24 25 26 27 28 29 20	9.106973 .107951 .108927 .109901 .110678 .111842 .112809 .113774 .114737 .115696	16.30 16.27 16.23 16.20 16.15 16.12 16.08 16.05 16.02	9.996417 .996400 .996384 .996368 .996351 .996318 .996318 .996302 .996285	.28 .27 .27 .28 .27 .28 .27 .28	9.110556 .111551 .112543 .113538 .114521 .115507 .116491 .117472 .118452	16.58 16.53 16.50 16.47 16.43 16.40 16.35 16.38 16.28	10.889444 .888449 .887457 .886467 .885479 .884493 .883509 .882528 .881548	39 38 37 36 35 34 33 32 31
81 82 88 84 85 86 87 88 89 40	9 116656 117613 118567 119519 120469 121417 122362 123366 124248 125187	15.97 15.95 15.90 15.87 15.83 15.75 15.73 15.70 15.65	9.996252 .996285 .996219 .996202 .996185 .996151 .996151 .996114 .996100		9.120404 .121377 .122348 .123317 .124284 .125249 .126211 .127172 .128130 .129067	16.25 16.22 16.18 16.15 16.19 16.08 16.03 16.02 15.97	10.879596 878623 877652 876683 .875716 .874751 .873789 .87289 .87289 .871870	29 28 27 25 25 24 23 21 20
41 42 43 44 45 46 47 48 49 50	9.126125 .127060 .127993 .128925 .129854 .130781 .131706 .132680 .133551 .134470	15.63 15.58 15.55 15.53 15.48 15.45 15.42 15.40 15.35 15.32	9.996083 .996049 .996049 .996032 .996015 .995998 .995983 .995963 .995946	.28	9.190041 .130994 .131944 .132893 .133839 .184784 .135726 .136667 .187605	15.90 15.88 15.89 15.82 15.77 15.75 15.70 15.68 15.68 15.68	10.869959 .869006 .868056 .867107 .866161 .865216 .864274 .863333 .862395 .861458	19 18 17 16 15 14 13 12 11
51 52 53 54 55 56 57 58	9.135387 .136303 .137216 .138128 .139037 .139944 .140850 .141734 .142655	15.28 15.27 15.22 15.20 15.15 15.10 15.07 15.02 15.00	995911 .995894 .995876 .995859 .995841 .995823 .995806 .995778	.28 .30 .28 .30 .28 .80 .28 .30	9 139476 140409 141340 142269 143196 144121 145044 145966 146885	15.57 15.55 15.52 15.48 15.45 15.45 15.38 15.38 15.32 15.30	10 860524 .859591 .858660 .857731 .856804 .855879 .854956 .854084 .853115	9 8 7 6 5 4 8 2
60	2.143555 Cosine.	D. 1".	9.995758 Sine.	D. 1°.	9.147903 Cotang.	D. 1'.	10.852197 Tang.	,

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	Sine.	D. 1*.	Cosine.	D. 1'.	Tang.	D. 1*.	Cotang.	,
0	9.143555	14.97	9.995758 .995735	.80	9.147808 .148718	15.25	10.852197 .851282	60
2	.145349	14.98	.995717	.30	.149632	15.28	.850368	59 58
8	.146243	14.90 14.88	.995699	.30 .30	.150544	15.20 15.17	.849456	57
4	.147136	14.83	.995681	.28	.151454	15.15	.848546	57 56 55 54
5	.148026	14.82	.995664	.30	. 152363	15.10	.847687	55
7	.148915	14.78	.995646 .995628	.30	.153269 .154174	15.08	.8467 31 .8458 26	59
8	150686	14.78	.995610	.30	.155077	15.05	.844923	58 58
ğ	.151569	14.72	.995591	.32	.155978	15.02	. 844022	51
10	.152451	14.70 14.65	.995573	:30	.156877	14.98 14.97	.843123	50
11	9.153330	14.63	9.995555	.30	9.157775	14.93	10.842225 .841329	49
12	.154208 .155083	14.58	.995519	.30	.159565	14.90	.840435	48 47
14	.155957	14.57	.995501	.80	160457	14.87	.839543	46
15	.156830	14.55 14.50	.995482	.82 .30	.161347	14.83 14.82	.838658	45
16	.157700	14.48	.995464	30	.162236	14.78	.837764	44
17	.158569	14.43	.995446	32	.163128	14.75	.836877	48
18 19	.159435 .160301	14.43	.995427 .995409	.30	.164008 .164892	14.73	.835992 .835108	42 41
20	.161164	14.38 14.35	.995390	.32	.165774	14.70 14.67	.834226	40
21	9.162025	14.33	9.995372	.32	9.166654	14.63	10.833346	39
22 23	.162885	14.30	.995353 .995334	.32	.167532 .168409	14.62	.832468 .831591	88
24	.164600	14.28	.995316	.30	169284	14.58	.830716	37 36
25	.165454	14.23	995297	.32	170157	14.55	.829843	85
26 27 28 29	. 166307	14.22 14.20	.995278	.32	.171029	14.58 14.50	.828971	84
27	.167159	14.15	.995260	.32	.171899	14.47	,828101	38
28	.168008 .168856	14.13	.995241 .995222	.32	.172767 .173634	14.45	.8272 33 .8263 66	82
30	.169702	14.10	.995203	.32	.174499	14.42	.825501	81 30
31	9.170547	14.08 14.03	9.995184	.82	9.175362	14.38 14.37	10.824638	20
32	.171389	14.03	.995165	.32	.176224	14.33	.823776	28
33	.172230	14.00	.995146	.32	.177084	14.80	.822916	27
34 35	.173070 .173908	13.97	.995127 .995108	.32	.177942	14.28	.822058 .821201	26 25
36	.174744	13.93	.995089	.32	179655	14 27	.820345	24
37	.175578	13.90 13.88	.995070	.32	.180508	14.22 14.20	.819492	28
38	.176411	13.85	.995051	.32	.181360	14.18	.818640	22
39 40	.177242 .178072	13.83	.995032 .995013	.32	.182211	14.18	.817789	21 20
41	9.178900	13.80	9.994993	.33	9.183907	14.13	.816941 10.816098	19
42	.179726	13.77	.994974	.32	.184752	14.08	.815248	18
43	.180551	18.75 18.72	.994955	.32	.185597	14.08 14.03	.814408	17
44	.181374	13.70	.994935	.32	.186439	14.02	.818561	16
45 46	.182196	13.67	.994916 .994896	.33	.187280	14.00	.812720	15
47	.183016 .183834	13.63	.994877	.32	.188120 .188958	13.97	.811880 .811042	14 18
48	.184651	13.62	.994857	.33	.189794	18.98	.810206	12
49	.185466	13.58 13.57	.994838	.32 .33	.190629	13.92 13.88	.809371	11
50	.186280	13.53	.994818	.33	.191462	18.87	.808538	10
51 52	9.187092 .187903	13.52	9.994798	.32	9.192294 .193124	13.83	10.807706 .806876	9
53	.188712	13.48	.994759	.33	.193953	18.82	.806047	7
54	.189519	13.45 13.43	.994739	.83	.194780	13.78 13.77	.805220	6
55	.190325	13.42	.994720	.83	.195606	13.73	.804394	5
56 57	.191130 .191933	13.38	.994700 .994680	.83	.196430 .197258	13.72	.808570 .802747	8
58	192734	13.35	994660	.83	198074	13.68	.801926	2
59	. 193534	13 33 13 30	.994640	.33	.198894	18.67 18.65	.801106 10.800287	1
60	9.194332	10.00	9.994620		9.199713	10.00	10.800287	_0
1	Cosine.	D. 1'.	Sine.	D. 1".	Cotang.	D. 1".	Tang.	7

980

Sine D. 1' Cosine D. 1' Tang D. 1' Cotang	•	TABLE X.—LOGARTHMIC SINES,									
1 195129 13.28 994500 38 200297 13.00 799477 59 2 196825 13.27 994500 38 201345 13.50 799457 59 3 196719 13.20 994540 38 201345 13.57 797841 57 5 198302 13.18 994590 38 202971 13.58 797846 55 6 199091 13.18 994499 38 204572 13.60 796406 54 6 199091 13.13 994499 38 204592 13.60 796406 54 6 199091 13.13 994499 38 204500 13.47 794600 53 9 201451 13.06 994459 38 205400 13.47 794600 53 9 201451 13.06 994459 38 205400 13.47 794600 53 10 202234 13.06 994459 38 205400 13.47 794600 53 11 9.20234 13.06 994459 38 206207 13.44 794600 53 12 2045797 13.00 994459 38 207617 13.44 792677 14.205877 13.00 994577 38 204601 13.47 794500 44 12 204577 13.00 994577 38 20460 13.38 792687 51 13 205797 13.00 994577 38 20460 13.38 792688 50 16 206131 12.86 994356 35 211018 13.50 798864 46 16 206306 13.28 994255 35 211018 13.50 788686 46 17 207679 13.86 994274 35 211815 13.87 78789 47 19 206223 12.83 994274 35 211815 13.28 788602 42 19 206223 12.83 994274 35 211815 13.28 788602 42 21 9.207670 12.86 994274 35 211815 13.28 788602 42 21 9.207670 12.86 994274 35 211815 13.28 788602 42 21 9.207670 12.80 994274 35 211846 13.23 788602 42 22 211856 12.72 994171 33 217586 13.18 785901 47 22 211856 12.72 994171 33 217586 13.18 785901 47 22 211856 12.72 994171 33 217586 13.18 785901 44 22 211856 12.73 994171 33 217586 13.18 785901 44 22 211856 12.73 994171 33 217586 13.18 785901 44 22 211858 12.72 994106 35 218926 13.10 7776788 39 24 21206 12.20 994066 35 229771 13.00 777678 30 25 213679 12.66 994065 35 229677 12.00 777678 30 25 213679 12.66 994067 35 229677 12.00 777678 30 25 213679 12.66 994078 35 228607 12.20 777698 30 27 215886 12.55 994608 35 229670 12.55 777696 30 28 216694 12.20 996860 37 228607 12.20 777698 30 29 216864 12.25 996860 37 228607 12.20 777698 30 20 217609 12.80 996860 37 228607 12.20 777698 30 20 217609 12.80 996860 37 228607 12.20 777698 30 20 217609 12.80 996860 37 228607 12.20 777698 30 20 2277615 12.00 996418 37 2286871 12.45 776666 30 20 228761 12.20 996860 37 228667 12.20 777698 30 20 2277615 12.00 996870 37 228689 12.00 77	٨.	Sine.	D. 1'.	Cosine.	D. 1*.	Tang.	D. 1*.	Cotang.	·		
1 195129 13.28 994500 38 200297 13.00 799477 59 2 196825 13.27 994500 38 201345 13.50 799457 59 3 196719 13.20 994540 38 201345 13.57 797841 57 5 198302 13.18 994590 38 202971 13.58 797846 55 6 199091 13.18 994499 38 204572 13.60 796406 54 6 199091 13.13 994499 38 204592 13.60 796406 54 6 199091 13.13 994499 38 204500 13.47 794600 53 9 201451 13.06 994459 38 205400 13.47 794600 53 9 201451 13.06 994459 38 205400 13.47 794600 53 10 202234 13.06 994459 38 205400 13.47 794600 53 11 9.20234 13.06 994459 38 206207 13.44 794600 53 12 2045797 13.00 994459 38 207617 13.44 792677 14.205877 13.00 994577 38 204601 13.47 794500 44 12 204577 13.00 994577 38 20460 13.38 792687 51 13 205797 13.00 994577 38 20460 13.38 792688 50 16 206131 12.86 994356 35 211018 13.50 798864 46 16 206306 13.28 994255 35 211018 13.50 788686 46 17 207679 13.86 994274 35 211815 13.87 78789 47 19 206223 12.83 994274 35 211815 13.28 788602 42 19 206223 12.83 994274 35 211815 13.28 788602 42 21 9.207670 12.86 994274 35 211815 13.28 788602 42 21 9.207670 12.86 994274 35 211815 13.28 788602 42 21 9.207670 12.80 994274 35 211846 13.23 788602 42 22 211856 12.72 994171 33 217586 13.18 785901 47 22 211856 12.72 994171 33 217586 13.18 785901 47 22 211856 12.72 994171 33 217586 13.18 785901 44 22 211856 12.73 994171 33 217586 13.18 785901 44 22 211856 12.73 994171 33 217586 13.18 785901 44 22 211858 12.72 994106 35 218926 13.10 7776788 39 24 21206 12.20 994066 35 229771 13.00 777678 30 25 213679 12.66 994065 35 229677 12.00 777678 30 25 213679 12.66 994067 35 229677 12.00 777678 30 25 213679 12.66 994078 35 228607 12.20 777698 30 27 215886 12.55 994608 35 229670 12.55 777696 30 28 216694 12.20 996860 37 228607 12.20 777698 30 29 216864 12.25 996860 37 228607 12.20 777698 30 20 217609 12.80 996860 37 228607 12.20 777698 30 20 217609 12.80 996860 37 228607 12.20 777698 30 20 217609 12.80 996860 37 228607 12.20 777698 30 20 2277615 12.00 996418 37 2286871 12.45 776666 30 20 228761 12.20 996860 37 228667 12.20 777698 30 20 2277615 12.00 996870 37 228689 12.00 77		9.194332	40.00	9.994620		9.199713		10.800287	60		
2 1196825 13.22 994500 38 201519 13.57 796855 58 197511 13.20 994500 38 202159 13.57 797841 57 51 197511 13.20 994500 38 202159 13.57 797841 57 51 197511 13.20 994519 35 202759 13.62 797099 56 51 199091 13.15 994519 35 202759 13.62 797099 56 51 199091 13.15 994459 38 202600 13.47 795400 54 51 13.00 994459 38 205400 13.47 795400 54 51 13.00 994459 38 205400 13.47 795400 54 51 13.00 994459 38 205400 13.47 795400 54 51 13.00 994459 38 205400 13.47 795400 54 51 13.00 994459 38 207517 13.44 775298 51 12 202757 13.00 994459 38 207517 13.44 775298 51 12 202757 13.00 994459 38 207517 13.37 775298 51 12 202757 13.00 994459 38 207517 13.37 775298 51 12 202777 13.00 994577 35 209420 13.35 775298 41 202777 13.00 99457 35 209420 13.35 775298 41 202777 13.00 99457 35 209420 13.35 775298 41 202777 13.00 99457 35 209420 13.35 775950 47 759550 48 202777 13.00 99457 35 209420 13.35 775950 47 759550 48 202777 13.88 994254 38 211018 13.29 758598 44 15 20650 13.29 99425 35 212611 13.27 758598 44 18 206422 12.89 99425 35 212611 13.27 758598 44 18 206422 12.89 99425 35 212611 13.27 758598 44 18 206422 12.89 99425 35 212611 13.27 758598 44 18 206422 12.80 994274 38 213605 13.29 775961 42 20221 12.75 994120 35 212611 13.19 775960 44 22291 12.75 994120 35 212611 13.19 775960 44 22291 12.75 994120 35 212611 13.10 758420 40 277596 34 22291 12.75 994120 35 212621 13.00 778588 49 22261 12.60 994067 35 222621 13.00 778588 24 22261 12.26 5994067 35 222622 12.80 994067 35 222625 12.80 994067 35 222625 12.80 994068 35 222625 12.80 994068 35 222625 12.80 994068 35 222625 12.80 994068 35 222625 12.80 994068 35 222625 12.80 774404 36 222625 12.80 994068 35 222625 12.80 777444 48 2226261 12.49 996886 35 222626 12.80 994068 35 222626 12.80 994068 35 222626 12.80 994068 35 222626 12.80 994068 35 222626 12.80 994068 35 222626 12.80 994068 35 222626 12.80 994068 35 222626 12.80 994068 35 222626 12.80 994068 35 222626 12.80 994068 35 222626 12.80 994068 35 222626 12.80 994068 35 222626 12.80 994068 35 222626 12.80 994068 35 222626 12.80 994068 35 222626							18.60	.799471			
4 197511 13.05 994590 .35 .202571 13.02 .797089 56 6 199091 13.15 994499 .38 .208782 13.00 .796406 54 7 199679 13.18 .994479 .38 .205400 13.47 .796406 54 8 .200666 13.18 .994479 .38 .205400 13.47 .796406 54 9 .201451 13.06 .994438 .35 .205400 13.47 .796406 54 9 .201451 13.06 .994438 .35 .207617 13.43 .798783 52 10 .202234 13.06 .994438 .35 .207617 13.43 .798783 52 11 9 .208797 13.00 .994397 .35 .200420 13.85 .798287 51 12 .208797 13.00 .994387 .35 .200420 13.87 .792183 50 13 .204877 13.00 .994387 .35 .200420 13.88 .789780 47 14 .20534 13.65 .994386 .35 .211038 13.89 .789882 46 15 .206131 12.86 .994386 .35 .211038 13.89 .789882 46 16 .20606 12 .22 .994316 .38 .211315 13.89 .788982 46 17 .207679 12.88 .994283 .35 .212461 13.27 .788185 45 18 .206452 12.83 .994283 .35 .212461 13.27 .788185 45 19 .20622 12.83 .994283 .35 .214089 13.18 .788982 44 17 .207679 12.88 .994283 .35 .214089 13.18 .788982 44 18 .20622 12.83 .994283 .35 .214089 13.18 .788982 44 19 .20622 12.80 .994213 .35 .214089 13.18 .788982 44 19 .20622 12.80 .994213 .35 .214089 13.18 .788902 42 21 .210760 12 .77 .994171 .38 .217626 13.18 .10 .788482 40 22 .212221 12 .75 .994170 .35 .218142 13.10 .788482 40 23 .212291 12 .75 .994170 .35 .218142 13.10 .788482 40 24 .212665 13 .73 .994180 .35 .218483 13.0 .788482 40 25 .212671 12 .66 .994067 .35 .22620 13.00 .778782 32 25 .212681 12 .76 .99406 .35 .221672 13.00 .778782 32 25 .212681 12 .50 .99406 .35 .221672 13.00 .778782 32 25 .212684 13 .56 .994067 .35 .22620 12 .85 .773500 64 26 .22661 12 .49 .968864 .37 .22626 12 .90 .777174 18 26 .22661 12 .49 .968864 .37 .22626 12 .90 .777174 18 27 .212888 12 .65 .994067 .35 .226670 12 .95 .777170 31 28 .22661 12 .49 .968864 .37 .22668 12 .90 .777174 18 29 .21684 12 .50 .998866 .37 .226670 12 .95 .777170 31 20 .22661 12 .30 .998866 .37 .226671 12 .95 .777170 31 20 .22661 12 .30 .998866 .37 .226671 12 .95 .777170 32 21 .22681 12 .20 .998866 .37 .226671 12 .95 .777170 31 22 .226771 12 .20 .998866 .37 .226671 12 .90 .777174 18 22 .22681 12 .20 .998866 .37 .226671 12 .90 .7	. 2	.195925		.994580	.88	.201345	13.00	.798655	58		
4 197511 13.05 994590 .35 .202571 13.02 .797089 56 6 199091 13.15 994499 .38 .208782 13.00 .796406 54 7 199679 13.18 .994479 .38 .205400 13.47 .796406 54 8 .200666 13.18 .994479 .38 .205400 13.47 .796406 54 9 .201451 13.06 .994438 .35 .205400 13.47 .796406 54 9 .201451 13.06 .994438 .35 .207617 13.43 .798783 52 10 .202234 13.06 .994438 .35 .207617 13.43 .798783 52 11 9 .208797 13.00 .994397 .35 .200420 13.85 .798287 51 12 .208797 13.00 .994387 .35 .200420 13.87 .792183 50 13 .204877 13.00 .994387 .35 .200420 13.88 .789780 47 14 .20534 13.65 .994386 .35 .211038 13.89 .789882 46 15 .206131 12.86 .994386 .35 .211038 13.89 .789882 46 16 .20606 12 .22 .994316 .38 .211315 13.89 .788982 46 17 .207679 12.88 .994283 .35 .212461 13.27 .788185 45 18 .206452 12.83 .994283 .35 .212461 13.27 .788185 45 19 .20622 12.83 .994283 .35 .214089 13.18 .788982 44 17 .207679 12.88 .994283 .35 .214089 13.18 .788982 44 18 .20622 12.83 .994283 .35 .214089 13.18 .788982 44 19 .20622 12.80 .994213 .35 .214089 13.18 .788982 44 19 .20622 12.80 .994213 .35 .214089 13.18 .788902 42 21 .210760 12 .77 .994171 .38 .217626 13.18 .10 .788482 40 22 .212221 12 .75 .994170 .35 .218142 13.10 .788482 40 23 .212291 12 .75 .994170 .35 .218142 13.10 .788482 40 24 .212665 13 .73 .994180 .35 .218483 13.0 .788482 40 25 .212671 12 .66 .994067 .35 .22620 13.00 .778782 32 25 .212681 12 .76 .99406 .35 .221672 13.00 .778782 32 25 .212681 12 .50 .99406 .35 .221672 13.00 .778782 32 25 .212684 13 .56 .994067 .35 .22620 12 .85 .773500 64 26 .22661 12 .49 .968864 .37 .22626 12 .90 .777174 18 26 .22661 12 .49 .968864 .37 .22626 12 .90 .777174 18 27 .212888 12 .65 .994067 .35 .226670 12 .95 .777170 31 28 .22661 12 .49 .968864 .37 .22668 12 .90 .777174 18 29 .21684 12 .50 .998866 .37 .226670 12 .95 .777170 31 20 .22661 12 .30 .998866 .37 .226671 12 .95 .777170 31 20 .22661 12 .30 .998866 .37 .226671 12 .95 .777170 32 21 .22681 12 .20 .998866 .37 .226671 12 .95 .777170 31 22 .226771 12 .20 .998866 .37 .226671 12 .90 .777174 18 22 .22681 12 .20 .998866 .37 .226671 12 .90 .7	8	.196719	19 90	.994560	.00		10.07	.797841	57		
6 . 199091 13.15 994499 .83 .24592 13.47 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .795408 54 .79	4	.197511	19 19		.00	.202971	19.50	.797029	56		
7 1.198679 18.18 2 994479 38 2.20540 18.47 7.79460 58 8 2.00666 18.06 994488 35 2.00627 18.48 7.79460 59 9.201451 18.05 994488 35 2.07073 18.48 7.79267 19.20224 18.05 994488 35 2.07073 18.48 7.79267 18.20224 18.05 994488 35 2.07073 18.49 7.79268 50 11 9.203017 18.06 994487 38 2.07073 18.49 7.79268 50 11 9.203017 18.00 994377 38 2.09420 18.35 7.79580 48 7.79267 18.20220 12.20 994386 35 2.10220 18.35 7.79580 48 7.79580 14.202364 12.20 994386 35 2.10220 18.30 7.79580 48 7.79580 14.202364 12.20 994386 35 2.10108 18.30 7.785790 47 14.202364 12.20 994285 35 2.11615 18.27 7.87389 44 17 2.07679 12.88 994274 35 2.13405 18.22 7.78580 44 17 2.07679 12.88 994224 33 2.13405 18.22 7.78580 48 18.202422 12.83 994224 33 2.1469 18.22 7.78580 48 19 2.20222 12.80 994285 35 2.14699 18.18 7.78580 48 19 2.20222 12.80 994285 35 2.14699 18.18 7.78580 48 19 2.20222 12.80 994212 35 2.15780 18.18 7.784220 40 19 2.10760 12.77 9.94171 38 2.15780 18.18 7.784220 40 19 2.15265 12.72 994129 35 2.15280 18.31 8 7.78564 38 2.1221 12.75 994171 38 2.122005 12.77 994171 38 2.122005 12.70 994129 35 2.12806 18.30 7.78568 48 2.1221 12.75 994170 35 2.12820 18.30 7.78568 49 2.1221 12.75 994170 35 2.12820 18.30 7.78568 36 2.12661 18.20 7.78580 12.60 994065 35 2.129710 18.00 7.78568 36 2.12469 18.18 18.00 7.78568 36 2.12469 18.18 18.00 7.78568 36 2.12469 18.18 18.00 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78568 36 2.12469 18.30 7.78	5	.196302			.93		18.50		55		
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9	7		18.12		.33	.205400			58		
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18			12.88		.35		13.23		44		
19 200922 12.83 994233 35 214989 18.18 785011 41,	17		12.88		.83		13,22				
19	18	.208402	12.83			.214198	13.18		42		
20	19		12.88		.35	.214969	13.18		41		
22	20	.200003	12.80	.994212	.35	.215780	13.13	.7042220			
28	21		19 777		99	9.216568	19 19		39		
94 219056 12-172 994129 -35 218926 13-07 781074 36 95 2183818 12-72 994108 -35 219710 13-07 780209 35 26 214579 12-65 .994087 -35 .220492 13-00 .779508 34 27 .215888 12-65 .994045 -35 .222052 13-07 .777948 32 28 .216097 12-65 .994045 -35 .222807 13-07 .777948 32 30 .217609 12-57 .994003 -35 .222807 12-95 .7777170 31 31 9.216863 12-57 .994003 -35 .222807 12-95 .777948 32 32 .21916 12-55 .998909 -35 .225156 12-90 10-775618 29 34 .220618 12-50 .998908 -35 .226700 12-86 .774401 27	22	.211526	10 7%		95		19 10		38		
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99 216854 12 .58 .994024 .35 .228890 12 .58 .777170 31 30 217603 12 .57 .994003 .35 .228607 12 .58 .777170 31 31 9.216863 12 .55 .993962 .37 9.224882 12 .90 10.775618 29 32 .219668 12 .55 .993960 .35 .225156 12 .90 .774844 28 34 .220618 12 .50 .993875 .35 .226700 12 .85 .774300 26 35 .221807 12 .47 .993875 .35 .226701 12 .85 .773300 26 36 .222115 12 .47 .993875 .35 .2224039 12 .80 .777761 24 37 .222961 12 .42 .993875 .35 .2220039 12 .80 .771761 24 38 .223606 12 .42 .993878 .35 .223039 12 .77 .770939 23 <td>24</td> <td></td> <td>12.72</td> <td></td> <td>.00</td> <td></td> <td>13.07</td> <td>.781074</td> <td>36</td>	24		12.72		.00		13.07	.781074	36		
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99 216854 12 .58 .994024 .35 .228890 12 .58 .777170 31 30 217603 12 .57 .994003 .35 .228607 12 .58 .777170 31 31 9.216863 12 .55 .993962 .37 9.224882 12 .90 10.775618 29 32 .219668 12 .55 .993960 .35 .225156 12 .90 .774844 28 34 .220618 12 .50 .993875 .35 .226700 12 .85 .774300 26 35 .221807 12 .47 .993875 .35 .226701 12 .85 .773300 26 36 .222115 12 .47 .993875 .35 .2224039 12 .80 .777761 24 37 .222961 12 .42 .993875 .35 .2220039 12 .80 .771761 24 38 .223606 12 .42 .993878 .35 .223039 12 .77 .770939 23 <td>26</td> <td>.214579</td> <td>12.65</td> <td>.994087</td> <td></td> <td>.220492</td> <td>18.00</td> <td>.779508</td> <td>84</td>	26	.214579	12.65	.994087		.220492	18.00	.779508	84		
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80 217609 12.57 .994003 .35 .228607 12.93 .776383 30 31 9.216863 12.57 .994003 .35 .224867 12.93 .776383 30 32 .219116 12.55 .998960 .35 .225156 12.90 10.77618 22 33 .21968 12.50 .998918 .35 .225629 12.85 .774071 27 34 .220618 12.40 .998918 .35 .226700 12.85 .774071 27 36 .222115 12.43 .998875 .87 .222471 12.80 .7772529 25 37 .222861 12.42 .998882 .37 .2229007 12.80 .777032 23 39 .22449 12.38 .998811 .35 .2231302 12.77 .776441 22 40 .222602 12.35 .993768 .37 .231302 12.72 .766461 21	28	.216097	12.62				12.97	.777948	82		
31 9.218888 12.57 9.939892 35 9.224882 12.93 10.775618 29 32 .219168 12.55 9.939892 37 .225156 12.90 10.775618 29 34 .220618 12.45 .993993 35 .225929 12.85 .774071 28 35 .221367 12.47 .993997 37 .224391 12.85 .773900 26 36 .222115 12.47 .9939875 37 .224393 12.80 .777590 26 37 .2236961 12.48 .99381 .35 .229007 12.80 .777590 26 38 .223606 12.24 .993854 .35 .229007 12.80 .777694 27 10.7693 23 39 .224349 12.38 .993789 .35 .231302 12.77 .769461 21 41 .222583 12.38 .993789 .35 .231302 12.72 .769	29	.210804	12.58	.994024			12.95	.777170	81		
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87 222861 12.42 993684 -37 229007 12.77 777098 22 89 228060 12.84 993832 -37 229773 12.77 777098 23 39 224349 12.85 993789 35 2290539 12.77 769461 21 40 225082 12.35 993789 35 231302 12.72 768681 21 41 9.228683 12.38 9.93768 37 232896 12.67 767174 18 43 2.225731 12.29 993725 35 233886 12.67 767174 18 44 229048 12.27 993708 37 2234345 12.65 766414 12 45 225784 12.29 993680 37 223689 12.67 766414 14 47 230852 12.29 993690 35 235859 12.60 764441 14 47 23085			12.50	.998939	85		12.85	.774071	27		
87 222861 12.42 993684 -37 229007 12.77 777098 22 89 228060 12.84 993832 -37 229773 12.77 777098 23 39 224349 12.85 993789 35 2290539 12.77 769461 21 40 225082 12.35 993789 35 231302 12.72 768681 21 41 9.228683 12.38 9.93768 37 232896 12.67 767174 18 43 2.225731 12.29 993725 35 233886 12.67 767174 18 44 229048 12.27 993708 37 2234345 12.65 766414 12 45 225784 12.29 993680 37 223689 12.67 766414 14 47 230852 12.29 993690 35 235859 12.60 764441 14 47 23085	84	.220618		.998918	85		12.85	.773300	26		
87 222861 12.42 993684 -37 229007 12.77 777098 22 89 228060 12.84 993832 -37 229773 12.77 777098 23 39 224349 12.85 993789 35 2290539 12.77 769461 21 40 225082 12.35 993789 35 231302 12.72 768681 21 41 9.228683 12.38 9.93768 37 232896 12.67 767174 18 43 2.225731 12.29 993725 35 233886 12.67 767174 18 44 229048 12.27 993708 37 2234345 12.65 766414 12 45 225784 12.29 993680 37 223689 12.67 766414 14 47 230852 12.29 993690 35 235859 12.60 764441 14 47 23085	35		12.47		.87	.227471	12.80	.772529	25		
40	86	.2222115	12.43				12.80		24		
40	87		12.42	. 200002	.37		12.77	770999	20		
40	90		12.38		.85		12.77	760461	01		
41 9.225888 12.83 9.998768 .37 9.239065 12.68 10.767935 19 43 2.237311 12.30 998725 .35 239566 12.67 767174 14 44 228048 12.27 998705 .37 239586 12.67 766614 17 44 228048 12.28 99861 .37 235108 12.63 766654 16 45 228784 12.23 998661 .37 235108 12.63 768654 16 46 228518 12.28 998660 .37 235108 12.63 768697 15 46 228518 12.29 998660 .37 235859 12.55 764897 15 47 230252 12.20 998681 .37 235108 12.55 76859 12 48 230964 12.10 998594 .37 238190 12.55 76680 11 50 232444 12.15 998572 .37 238872 12.55 76180 11 51 9.23172 12.13 998550 .37 238872 12.55 76180 11 51 9.23172 12.19 998550 .37 238872 12.50 761128 10 51 9.23172 12.10 998594 .37 248872 12.53 76128 10 52 233899 12.12 998550 .37 240871 12.48 759629 8 53 234025 12.07 998494 .37 24118 12.45 75882 7 54 235349 12.07 998494 .37 24118 12.45 75882 7 55 236735 12.00 998494 .37 24118 12.45 75882 7 55 236735 12.00 998494 .37 24118 12.45 75882 7 56 236735 12.00 998494 .37 241865 12.40 755305 5 58 236255 12.00 998418 .37 244607 12.85 755003 3 58 238255 11.97 993874 .37 2446579 12.33 755161 2 59 238967 11.95 993874 .37 2446579 12.33 755161 2 59 238967 11.95 993874 .38 244579 12.33 755161 0	40		12.38		.87	921209	12.72	769609	90		
43			12.85		.35	11	12.72				
43			12 33		37		12 68		19		
44	42		12.30		.35			.767174	18		
45		.227811	12.28	.998725	.87		12.65	700414	17		
77 290252 19.23 998638 .37 298614 19.56 7.763386 13 48 230964 19.30 998616 .37 237386 19.53 768383 13 49 231715 19.15 998504 .37 2383120 12.53 761283 10 50 232444 12.18 998572 .37 928873 12.50 76128 10 51 9.23172 12.13 9.93550 .37 9.238623 12.50 76128 10 52 233899 12.10 998528 .37 9.238623 12.48 10.766378 9.52 53 234625 12.07 998564 .37 241118 12.45 758882 7 54 23349 12.07 998464 .37 241118 12.45 758882 7 55 238549 12.07 998464 .37 241186 12.45 758882 7 55 238549 12.07 998464 .37 241186 12.45 758882 7 56 236073 12.07 998464 .37 241865 12.45 758863 6 57 237515 12.00 998418 .37 24354 12.40 758646 4 57 237515 12.00 998418 .37 244857 12.38 755903 3 58 238285 11.97 998374 .37 244857 12.37 755903 3 59 2389673 11.95 998374 .38 9.246579 12.33 755161 2 59 2389673 11.95 998374 .88 9.246579 12.33 755161 2 9.938361 .38 9.246579 12.33 755361 0	44		12.27	999103	.87		12.68	700000	10		
77 290252 19.23 998638 .37 298614 19.56 7.763386 13 48 230964 19.30 998616 .37 237386 19.53 768383 13 49 231715 19.15 998504 .37 2383120 12.53 761283 10 50 232444 12.18 998572 .37 928873 12.50 76128 10 51 9.23172 12.13 9.93550 .37 9.238623 12.50 76128 10 52 233899 12.10 998528 .37 9.238623 12.48 10.766378 9.52 53 234625 12.07 998564 .37 241118 12.45 758882 7 54 23349 12.07 998464 .37 241118 12.45 758882 7 55 238549 12.07 998464 .37 241186 12.45 758882 7 55 238549 12.07 998464 .37 241186 12.45 758882 7 56 236073 12.07 998464 .37 241865 12.45 758863 6 57 237515 12.00 998418 .37 24354 12.40 758646 4 57 237515 12.00 998418 .37 244857 12.38 755903 3 58 238285 11.97 998374 .37 244857 12.37 755903 3 59 2389673 11.95 998374 .38 9.246579 12.33 755161 2 59 2389673 11.95 998374 .88 9.246579 12.33 755161 2 9.938361 .38 9.246579 12.33 755361 0		000K10	12.28		.85		12.60				
49 .231715 12.15 .993694 .37 .238120 12.25 .761880 11 50 .232444 12.15 .993572 .37 .238872 12.55 .761880 11 51 9.233172 12.12 9.993550 .37 .243622 12.50 .76128 10 52 .233899 12.10 .993506 .37 .241118 12.45 .75863 .75863 .75883 .7 54 .230549 12.07 .993464 .37 .24118 12.45 .75883 .7 55 .236705 12.03 .993462 .37 .243616 12.40 .757390 5 56 .236705 12.00 .993440 .37 .243616 12.40 .755963 3 58 .236225 12.00 .993418 .37 .244354 12.80 .755903 3 58 .236235 11.97 .993874 37 .2443579 12.33 .755161 <td>40</td> <td>090000</td> <td>12.23</td> <td></td> <td>.37</td> <td></td> <td>12.58</td> <td></td> <td></td>	40	090000	12.23		.37		12.58				
49 .231715 12.15 .993694 .37 .238120 12.25 .761880 11 50 .232444 12.15 .993572 .37 .238872 12.55 .761880 11 51 9.233172 12.12 9.993550 .37 .243622 12.50 .76128 10 52 .233899 12.10 .993506 .37 .241118 12.45 .75863 .75863 .75883 .7 54 .230549 12.07 .993464 .37 .24118 12.45 .75883 .7 55 .236705 12.03 .993462 .37 .243616 12.40 .757390 5 56 .236705 12.00 .993440 .37 .243616 12.40 .755963 3 58 .236225 12.00 .993418 .37 .244354 12.80 .755903 3 58 .236235 11.97 .993874 37 .2443579 12.33 .755161 <td>40</td> <td></td> <td></td> <td></td> <td>.87</td> <td></td> <td></td> <td>769639</td> <td>12</td>	40				.87			769639	12		
50 .232444 12: 18 .998572 .37 .238872 12: 55 .761128 10 51 9.238172 12: 12 9.998550 .37 .228672 12: 55 17.76623 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12<	40		12.18		.87			781880	11		
51 9.233172 12.15 9.993550 .37 9.239623 12.48 10.760878 9 52 .233899 12.10 .993536 .37 .240371 12.48 17.56629 8 53 .234625 12.10 .993506 .37 .241111 12.45 .758638 .7 54 .2235349 12.07 .993484 .37 .241865 12.42 .757390 6 55 .236705 12.00 .993440 .37 .243810 12.40 .757390 6 56 .226705 12.00 .993440 .37 .244354 12.88 .755948 4 57 .237515 12.00 .993418 .37 .244354 12.88 .755908 3 58 .238235 11.97 .993874 .37 .2448579 12.33 .754421 1 60 9.239670 11.95 .993351 .38 .244579 12.33 .754421 1					.87						
52 .238899 12.12 .998528 .94 .940871 12.45 .759629 .8 58 .234625 12.10 .993506 .37 .241118 12.45 .759629 .8 .759629 .8 .759629 .9 .94118 12.45 .75883 .7 .75883 .7 .241185 12.45 .75883 .7 .75883 .7 .243610 12.40 .757390 .5 .262705 12.00 .998440 .37 .243610 12.40 .757390 .5 .757390 .5 .757390 .5 .240671 12.80 .755646 4 .757390 .5 .240671 12.80 .7559046 4 .757390 .5 .240671 12.80 .755903 3 .755903 3 .244639 12.23 .755903 3 .244639 12.23 .755161 2 .245579 12.33 .7554421 1 .755964 .755964 .755964 .755964 .755968 .245579 12.33 <t< td=""><td></td><td></td><td>12.18</td><td></td><td>.37</td><td>1</td><td>12.50</td><td>1</td><td></td></t<>			12.18		.37	1	12.50	1			
52 .2346925 12.10 .993506 .37 .241118 12.45 .758882 7 54 .235349 12.07 .993494 .37 .241118 12.45 .758185 6 55 .236073 12.07 .993492 .37 .24165 12.42 .757390 5 56 .236796 12.00 .993440 .37 .243354 12.88 .756946 4 57 .237515 12.00 .993440 .37 .244384 12.88 .756946 4 58 .23235 12.00 .993896 .37 .244389 12.87 .755903 3 59 .232953 11.97 .993874 .37 .244579 12.33 .754421 1 60 9.239670 11.95 .993351 .38 .245579 12.33 .754421 1	51		12.12		.87		12.48		1 8		
55 .236078 12.03 .998462 .37 .242610 12.40 .757390 5 56 .236795 12.00 .998440 .37 .84354 12.40 .757630 5 57 .227515 12.00 .998440 .37 .244697 12.86 .75503 3 58 .236285 11.97 .998396 .37 .244697 12.37 .755161 2 59 .238953 11.97 .9983974 .38 .246579 12.33 .755161 2 60 9.239670 11.95 .9983974 .88 .9.246579 12.33 .7554621 1 9.993351 .88 .246579 12.33 .755681 0	500	.2255599	12.10				12.45	109029	1 8		
55 .236078 12.03 .998462 .37 .242610 12.40 .757390 5 56 .236795 12.00 .998440 .37 .84354 12.40 .757630 5 57 .227515 12.00 .998440 .37 .244697 12.86 .75503 3 58 .236285 11.97 .998396 .37 .244697 12.37 .755161 2 59 .238953 11.97 .9983974 .38 .246579 12.33 .755161 2 60 9.239670 11.95 .9983974 .88 .9.246579 12.33 .7554621 1 9.993351 .88 .246579 12.33 .755681 0	20	.204020	12.07		.37		12.45		l a		
58 .238235 11.97 .948390 .37 .248539 12.83 .750101 2 60 9.239670 11.95 9.998374 .38 9.245579 12.33 .754421 1 10.753681 0	04 EK		12.07	09160	.87		12.42	757900	6		
58 .238235 11.97 .948390 .37 .248539 12.83 .750101 2 60 9.239670 11.95 9.998374 .38 9.245579 12.33 .754421 1 10.753681 0	00		12.03		.87		12.40	788848	1 4		
58 .238235 11.97 .948390 .37 .248539 12.83 .750101 2 60 9.239670 11.95 9.998374 .38 9.245579 12.33 .754421 1 10.753681 0	57		12.00	002412	.87		12.88		9		
60 9.239670 11.95 9.993351 .88 9.246319 12.33 10.753681 0	58		12.00		.87				2		
00 9.20001 9.20001 0.100001 V	60		11.97		.37			754421	ĩ		
	60		11.95		.88		12.33	10.753681			
^ Cosine. D. 1'. Sine. D. 1'. Cotang. D. 1'. Tang. '	_		<u> </u>			l			<u> </u>		
	٨	Cosine.	D. 1'.	Sine.	D. 1°.	Cotang.	D. 1".	Tang.	14.		

10°			·	•				169~
,	Sine.	D. 1'.	Cosine.	D. 1*.	Tang.	D. 1*.	Cotang.	′
0	9.239670	11.93	9.993351	.87	9.246319	12.30	10.753681	60
1	.240386	11.92	. 993329	.37	.247057	12.28	.752943	59
2	.241101	11.88	.993307	.38	.247794	12.27	.752906	58 57
8	.241814	11.87	.993284	.87	.248530	12.23	.751470	56
5	.243237	11.85	.993202	.37	.249264 .249998	12.23	.750786	55
6	.243947	11.83	.993217	.88	.250730	12.20	749270	54
7	244656	11.82	.993195	.37	.251461	12.18	748539	53
8	.245368	11.78	.993172	.38	.252191	12.17	.747809	52
9	.246069	11.77	.993149	.38 .37	.252920	12.15 12.18	.747080	51
10	.246775	11.72	.993127	.38	.253648	12.10	.746352	50
11	9.247478		9.993104		9.254374		10.745626	49
12	.248181	11.72 11.70	.993081	.38	.255100	12.10 12.07	.744900	48
13	.248883	11.67	.999059	.88	.255824	12.05	.744176	47
14	.249583	11.65	.993036	.88	.256547	12.03	.743458	46
15	.250282	11.68	.993013	.88	.257269	12.02	.742731	45 44
16 17	.250980 .251677	11.62	.992990 .992967	.88	.257990 .258710	12.00	.742010 .741290	43
18	.252378	11.60	.992944	.88	.259429	11.98	740571	42
19	.253067	11.57	.992921	.38	.260146	11.95	.739854	41
20	.253761	11.57	.992898	.88	.260863	11.95	.739137	40
21	9.254458	11.58	9.992875	.88	9.261578	11.92	10.738422	39
22	.255144	11.52	.992852	.88	.262292	11.90	.737708	88
23	.255834	11.50	.992829	.88	.263005	11.88	.736995	87
24	.256528	11.48	.992806	.88	.263717	11.87	.736283	86
25	.257211	11.47	.992788	.38	.264428	11.85	.735572	85
26 27	.257898	11.45 11.42	.992759	.40 .38	.265188	11.83 11.82	.734862	84
27	.258588	11.42	.992736	.38	.265847	11.80	.734158	33
28	.259268	11.38	.992718	.38	.266555	11.77	.738445	32
29 30	.259951 .260638	11.37	.992690 .992666	.40	.267261	11 77	732739	31 30
		11.35		.38	.267967	11.73		
81	9.261314	11.83	9.992643	.40	9.268671	11.73	10.781829	29
32	.261994	11.32	.992619	.38	.269375	11.70	.730625	28
34	.262673 .263351	11.30	.992596 .992572	.40	.270077	11.70	.729923 .729221	27 26
35	.264027	11.27	.992549	.38	.271479	11.67	.728521	25
36	.264708	11.27	.992525	.40	.272178	11.65	.727822	24
37	.265377	11.23	.992501	.40	.272876	11.63	.727124	23
38	.266051	11.23 11.20	.992478	.38 .40	.278573	11.62 11.60	.726427	22
89	.266723	11.20	.992454	.40	.274269	11.58	.725781	21
40	.267395	11.17	.992430	.40	.274964	11.57	.725086	20
41	9.268065	11.15	9.992406	.40	9.275658	11.55	10.724342	19
42	.268734	11.18	.992382	.38	.276351	11.53	.723649	18
43	.269402	11.12	.992359	.40	.277048	11.52	.722957	17
44 45	.270069	11.10	.992335	.40	.277784	11.50	.722266 .721576	16
46	.270735	11.08	.992311	.40	.278424 .279118	11.48	.721576	15 14
47	.272064	11.07	.992263	.40	.279801	11.47	.720199	18
48	.272726	11.08	992239	.40	.280488	11.45	.719512	12
49	.273388	11.08	.992214	.42	.281174	11.48	.718826	11
50	.274049	11.02 10.98	.992190	.40 .40	.281858	11.40 11.40	.718142	10
51	9.274708		9.992166		9.282542		10.717458	9
52	.275367	10.98	.992142	.40	.283225	11.38	.716775	8
53	.276025	10.97 10.98	.992118	.40 .42	.283907	11.37 11.35	.716093	7
54	.276681	10.93	.992093	.40	.284588	11.83	.715412	6
55	.277837	10.90	.992069	.42	.285268	11.32	.714732	5
56	.277991	10.90	.992044	.40	.285947	11.28	.714053	4
57 58	.278645	10.87	.992020 .991996	.40	.286624 .287301	11.28	.713376 .712699	8
59	.279948	10.85	.991990	.42	.287977	11.27	.712098	2 1
. 60	9.280599	10.85	9.991947	.40	9.288652	11.25	10.711348	l á l
′	Cosine.	D. 1.	Sine.	D. 1'.	Cotang.	D. 1'.	Tang.	1

11•		IADL	B A. B	OGAILI.		111110,		168•
['	Sine.	D. 1*.	Cosine.	D. 1*.	Tang.	D. 1*.	Cotang.	'
0	9.280599	10.00	9.991947	.42	9.288652	11.23	10.711348	60
1 1	.281248	10.82 10.82	.991922	.42	.289326	11.20	.710674	59
2 8	.281897	10.78	.991897	.40	.289999	11.22 11.20	.710001	58
8	.282544	10.77	.991873	.42	.290671	11.18	.709329	57
4	.283190	10.77	.991848 .991823	.42	.291342	11.18 11.15	.708658 .707987	56 55
5 6 7	.283836 .284480	10.73	.991799	.40	.292682	11.15	.707318	54
1 7	.285124	10.73	.991774	.42	.293350	11.13 11.12	.706650	53
8	.285766	10.70	.991749	.42 .42	.294017	11.12	.705983	52
9	.286408	10.70 10.67	.991724	.42	.294684	11.12 11.08	.705316	51
10	.287048	10.67	.991699	.42	.295349	11.07	.704651	50
11	9.287688	10.63	9.991674	.42	9.296013	11.07	10.703987	49
12	.288326	10.63	.991649	.42	296677	11.03	.703323	48
18	.288964	10.60	.991624	.42	.2973 39 .2980 01	11.03	.702661 .701999	47
14 15	.289600 .290236	1 10 60	.991599 .991574	.42	298662	11.02	.701338	45
16	.290870	10.57	.991549	.42	299322	11.00	.700678	44
17	.291504	10.57	.991524	.42	299980	10.97	.700020	48
1 18	.292137	10.55	.991498	.43	300638	10.97	.699362	42
19	.292768	10.52 10.52	.991478	.42	301995	10.95 10.93	.698705	41
20	.293399	10.50	.991448	.43	.301951	10.93	.698049	40
21	9.294029	1	9.991422	.42	9.302607	10.90	10.697393	39
22	.294658	10.48 10.47	.991397	.42	.303261	10.88	.696739	88
28	.295286	10.45	.991372	.43	.303914	10.88	.696086	87
24	.295913	10.43	.991346	.42	.804567	10.85	.695433	36 35
1 20	.296539 .297164	10.42	.991321 .991295	.43	.305218	10.85	.694782 .694131	34
25 26 27 28	.297788	10.40	.991270	.42	.306519	10.83	.693481	33
28	.298412	10.40	.991244	.43	.307168	10.82	.692832	32
29	.239034	10.37 10.35	.991218	.43 .42	.307816	10.80	.692184	31
30	.299655	10.35	.991193	.43	.308463	10.78 10.77	.691537	30
81	9.300276	1	9.991167	.43	9.309109		10.690891	29
82	.300895	10.32 10.32	.991141	.43	.809754	10.75 10.75 10.72	.690246	28 27 26
38	.801514	10.30	.991115	.42	.310399	10.72	689601	27
84	.802132	10.27	.991090	.43	.811042	10.72	.688958	26
85 36	.802748 .808364	10.27 10.27	.991064 .991038	.43	.311685 .312327	10.70	.688315 .687673	25 24
87	.803979	10.25	.991012	.43	.312968	10.68	687032	23
88	.304598	10.28	.990986	.48	.313608	10.67	.686392	23 22
89	.805207	10.23	.990960	.43 .43	.314247	10.65	.685753	21
40	.305819	10.20 10.18	.990934	.43	.314885	10.63 10.63	.685115	20
41	9.306430	I .	9.990908	l	9.315523	i .	10.684477	19
42	.807041	10.18 10.15	.990882	.43 .45	.316159	10.60 10.60	.683841	18
48	.807650	10.15	.990855	.43	.316795	10.58	.683205	17
44	.808259	10.13	.990829 .990803	.43	.817430	10.57	.682570	16
45 46	.808867	10.12	.990803	.43	.818064 .318697	10.55	.681936 .681303	15 14
47	.809474 .810080 .810685	10.10	.990750	.45	319330	10.55	.680670	13
48	.810685	10.08 10.07	.990724	.43	.319961	10.52 10.52	.680039	12
49	.811289	10.07	.990724 .990697	.45 .43	.320592	10.52	.679408	11
50	.811893	10.07 10.08	.990671	.43 .43	.321222	10.50 10.48	.678778	10
51	9.312495	10.03	9.990645	.45	9.321851	10.47	10.678149	9
59	.813097	10.08	.990618	.45	.322479	10.47	.677521	8
58	.313698	9.98	.990591	.43	.323106	10.45	.676894	7
54	.814297	10.00	.990565	.45	.323733	10.42	.676267	6
55 56	.814897 .815495	9.97	.990538 .990511	.45	.324358	10.42	.675642 .675017	
57	.816092	9.95	.990485	.43	. 324983	10.40	.674393	2
58	.816689	9.95	.990458	.45	.326231	10.40	.673769	2
59	.817284	9.92	.990431	.45	.826853	10.37	.673147	6 5 4 8 2
60	9.817879	9.92	9.990404	.45	9.327475	10.87	10.672525	ō
-	Codes	7 11	Cina		Coton	D 11	Tone	-
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,	Sine.	D. 1".	Cosine.	D. 1".	Tang.	D. 1'.	Cotang.	'
0	9.817879	2.00	9.990404		9.327475	10.00	10.672525	60
1 1	.818478	9.90 9.88	.990378	.43 .45	.328095	10.33 10.33	.671905	59
2	.819066	9.87	.990351	.45	.328715	10.32	.671285	58
8	.819658	9.85	.990324	.45	.320334	10.32	.670666	57
5	.820249 .820840	9.85	.990297 .990270	.45	.829953 .830570	10.28	.670047 .669480	56 55
6	.821430	9.83	.990243	.45	.831187	10.28	.668818	54
7	.822019	9.82	.990215	.47	.331808	10.27	.668197	58
8	. 822607	9.80 9.78	.990188	.45 .45	.332418	10.25 10.25	.667582	528
9	.823194	9.77	.990161	.45	.883088	10.22	.666967	51
10	.323780	9.77	.990184	.45	.333646	10.22	.666354	50
11	9.324366	9.73	9.990107	.47	9.334259	10.20	10.665741	49
12	. 324950	9.78	.990079	.45	.884871	10.18	.665129	48
18	.325534	9.72	.990052	.45	.335482	10.18	.664518 .663907	47
14 15	.826117 .826700	9.72	.989997	.47	.336093 .336702	10.15	.663298	46 45
16	.327281	9.68	.989970	.45	887811	10.15	.662689	44
17	.827862	9.68	.989942	.47	.337919	10.13	.662061	48
18	.328442	9.67 9.65	.989915	.45	.838527	10.13 10.10	.661478	42
19	.329021	9.63	.989887	.45	.839138	10.10	.660867	41
20	. 329599	9.62	.989860	.47	.839789	10.08	.660261	40
21	9.330176	9.62	9.989832	.47	9.840844	10.07	10.659656	89
22	.880758	9.60	.989804	.45	.340948	10.07	.659052	88
28	.831329	9.57	.989777	.47	.341552	10.05	.658448	87
24	.831908 .832478	9.58	.989749	.47	.842155 .842757	10.03	.657845 .657248	36 35
26	.833051	9.55	.989698	.47	.343358	10.02	.656642	84
27	.833624	9.55	.989665	.47	.343958	10.00	656042	88
28	.334195	9.52	.989637	.47	.344558	10.00	.655442	82
29	.834767	9.58 9.50	.989610	.45 .47	.845157	9.98 9.97	.654848	81
80	.335337	9.48	.989582	.48	.345755	9.97	.654245	30
81	9.335906	9.48	9.989553	.47	9.346353	9.98	10.653647	29
82	.836475	9.47	.989525	.47	.346949	9.98	.653051	28
38	.337043	9.45	.989497	.47	.347545	9.93	.652455	27 26
84 85	.337610 .338176	9.48	.989469 .989441	.47	.348141	9.90	.651859 .651265	25
36	.338742	9.48	.989413	.47	.349329	9.90	.650671	24
87	.339307	9.42	.989385	.47	.349922	9.88	.650078	28
88	.839871	9.40 9.38	.989856	.48 .47	.850514	9.87 9.87	.649486	22
89	.340434	9.37	.989328	47	.851106	9.85	.648894	21
40	.340996	9.87	.989300	.48	.351697	9.83	.648808	20
41	9.341558	9.35	9.989271	.47	9.852287	9.82	10.647718	19
42	.342119	9.33	.989243	:48	.852876	9.82	.647124	18
48	.842679 .843289	9.33	.989214	.47	.853465	9.80	.646585	17
44	.343797	9.30	.989186 .989157	.48	.854058 .854640	9.78	.645947 .645860	16 15
46	.844355	9.30	.989128	.48	.855227	9.78	.644773	14
47	.344912	9.28 9.28	.989100	.47	.355818	9.77	.644187	18
48	.345469	9.25	.989071	.48 .48	.856398	9.75 9.73	.648602	12
49	.346024	9.25	.989042	.47	.356982	9.73	.643018	11
50	.846579	9.25	.989014	.48	.857566	9.72	.642484	10
51	9.847134	9.22	9.988985	.48	9.858149	9.70	10.641851	9
52	.347687	9.22	.988956	.48	.858781	9.70	.641269	8
58	.348240	9.20	.988927	.48	.359318	9.67	.640687	7
54	.348792 .349343	9.18	.988898	.48	.359898	9.68	.640107 .639526	6 5
56	.849893	9.17	.988840	.48	.361058	9.65	.638947	2
57	.850448	9.17	.988811	.48	.861632	9.65	.638368	8
58	. 350992	9.15 9.18	.988782	.48 .48	.862210	9.63 9.62	.637790	2 1
59	.851540	9.18	.988753	.48	.862787	9.62	.637213	1
60	9.852088		9.988724		9.303364	0.00	10.636686	0
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1 389895 9.12 9.88966 48 383840 9.00 59065 59 2 383181 9.10 9.08 988366 48 384510 9.85 58481 58 3 385796 9.08 988367 48 385894 9.57 583485 56 5 385481 9.07 9.08 988367 48 385864 9.57 583491 57 5 354815 9.07 9.08 98838 50 386300 9.85 583491 57 8 354815 9.07 9.08 98838 50 386307 9.55 583491 57 8 354815 9.07 9.08 98831 50 386310 9.85 583190 54 8 385842 9.02 9.88469 48 367382 9.52 583207 52 9 385944 9.00 988400 50 386820 9.52 583207 52 9 385944 9.00 988400 50 386820 9.52 583207 52 10 387524 9.00 988400 50 386820 9.52 583207 52 11 9.385904 9.00 988400 50 386820 9.48 583000 50 11 9.385904 9.00 988400 50 386820 9.48 583000 50 11 9.385904 9.89 9.98831 50 370222 9.48 10 583636 48 12 386903 8.98 9.98831 50 370222 9.48 10 582901 47 14 385973 8.95 988382 50 371383 9.43 582901 47 15 385927 8.92 98832 50 371383 9.43 582901 47 16 380762 8.95 988382 50 371383 9.43 582901 47 17 361327 8.92 98832 50 371383 9.43 582901 47 18 385986 8.88 9.98831 50 371383 9.43 582901 47 19 385286 8.90 988163 50 371383 9.43 682891 42 20 385289 8.88 988183 50 374756 9.38 682507 41 20 385289 8.88 988183 50 374756 9.38 682507 41 20 385289 8.88 989833 50 374756 9.38 682507 41 20 385289 8.88 989833 50 3774756 9.38 682507 41 20 385289 8.88 98983 50 377499 9.42 682687 41 20 385289 8.88 98983 50 3774756 9.38 682507 41 20 385289 8.88 98983 50 3774756 9.38 682507 41 20 385289 8.88 98983 50 3774756 9.38 682507 41 20 385289 8.88 98983 50 3774756 9.38 682507 41 20 385289 8.88 98983 50 3774756 9.38 682507 41 20 385289 8.88 98983 50 387483 9.39 682507 41 20 385289 8.88 98983 50 98856 9.37 6868 9.38 682507 41 20 385289 8.88 98983 50 98856 9.37 6868 9.38 682507 41 20 385289 8.88 98983 50 98856 9.37 6868 9.38 682507 41 20 385289 8.88 98983 9.88 9.89 9.89 6868 9.37 6868 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38 68250 9.38	'	Sine.	D. 1'.	Cosine.	D. 1'.	Tang.	D. 1".	Cotang.	,
1 3.85685 9.16 9.08 986866 .48 386840 9.05 636460 59 2 383181 9.10 986866 .48 386840 9.05 636461 57 4 364271 9.08 986867 .48 386827 9.55 634910 57 5 364615 9.07 988578 .48 386827 9.55 633783 55 6 385838 9.05 988578 .48 386827 9.55 633783 55 6 385838 9.05 988578 .48 386827 9.55 633783 55 6 385858 9.05 988584 .50 386810 9.55 633190 54 7 385801 9.08 98840 .50 387853 9.52 633190 54 10 387524 9.00 98840 .50 387823 9.52 633147 52 11 9.386064 9.02 98840 .50 387823 9.52 633147 52 11 9.386064 8.98 9.98830 .50 380904 9.48 630906 50 11 9.386064 8.98 9.98831 .50 370399 9.45 632901 47 14 3.59678 8.95 988828 .50 371393 9.48 10.683874 91 15 386015 8.95 988828 .50 371393 9.43 628901 41 17 381287 8.92 98823 .48 373084 9.42 628831 46 18 361823 8.92 988135 .50 374089 9.42 62883 46 19 382889 8.88 .98 988135 .50 374089 9.42 628831 42 19 382866 8.98 9.98813 .50 374089 9.42 628867 41 18 361823 8.92 988232 .48 373084 9.42 628867 41 19 38286 8.88 .98 988135 .50 374089 9.42 628867 41 19 38286 8.88 .98 988135 .50 374089 9.42 628867 41 19 38286 8.88 .98 988135 .50 374089 9.42 628871 42 29 383164 8.85 988135 .50 374089 9.42 628871 42 29 383164 8.85 986903 .50 374089 9.42 628871 42 29 383164 8.85 986903 .50 374756 9.38 625944 40 20 382889 8.88 .98 988183 .50 374756 9.38 625944 40 20 382889 8.88 .98 988183 .50 374756 9.38 625944 40 21 9.363266 8.83 9.80913 .50 374756 9.38 622901 47 22 383164 8.85 986903 .50 374756 9.38 622907 32 29 365346 8.85 986903 .50 374756 9.38 622907 32 29 365346 8.85 986903 .50 374756 9.38 622907 32 29 365346 8.85 986903 .50 374756 9.38 622907 32 29 365346 8.85 986903 .50 374756 9.38 622907 32 20 365346 8.85 986903 .50 374756 9.38 622907 32 20 365346 8.85 986903 .50 374756 9.38 622907 32 20 365346 8.85 986903 .50 374756 9.38 622907 32 20 365346 8.85 986903 .50 374756 9.38 622907 32 20 365346 8.85 986903 .50 374756 9.38 622907 32 20 365346 8.85 986903 .50 374756 9.38 622907 32 21 36604 8.85 986908 .50 388680 9.22 663868 31 22 3836675 8.87 986908 .50 388880 9.22 663838 32 23 36604 8.77 986908 .50 388880 9.22 663838 32 2	0	9.352088		9.988724		9.363364		10.636686	60
2 383181 9.06 986866 .50 384615 9.05 68488 58 4 384871 9.06 986866 .50 386960 9.07 68488 56 5 384815 9.07 988876 .48 386864 9.07 68488 56 6 385838 9.05 9.88846 .50 386810 9.05 683189 54 7 385801 9.05 988846 .50 386810 9.05 683189 54 8 385843 9.03 988460 .48 387382 9.52 68328 53 9 3858643 9.00 988480 .48 387382 9.52 68328 53 9 3858643 9.00 988480 .48 387823 9.52 68328 51 10 3857834 9.00 988480 .48 386824 9.52 632947 52 11 9.386804 8.98 988481 .50 387082 9.48 683906 50 11 9.386808 8.98 988481 .50 370222 9.48 683906 51 12 386808 8.98 988812 .50 371383 9.43 682960 17 13 3859141 8.97 988342 .50 371383 9.43 682961 47 14 3859678 8.95 988812 .50 371383 9.43 682961 47 15 380215 8.95 988812 .50 371383 9.43 682961 47 16 380762 8.96 98882 .50 373499 9.44 6829601 47 17 361387 8.92 988192 .50 373499 9.42 682961 47 18 361387 8.92 988192 .50 373499 9.43 682961 47 19 .386286 8.88 988183 .50 373624 9.42 682863 44 19 .386286 8.88 988183 .50 378629 9.42 682863 44 19 .386286 8.88 988183 .50 378629 9.42 682863 44 19 .386286 8.88 988183 .50 378629 9.42 682863 44 22 9.386386 8.88 988183 .50 378629 9.42 682863 44 22 9.386386 8.88 988183 .50 378629 9.42 6828697 45 22 9.386386 8.88 988183 .50 378629 9.42 682863 44 22 9.386386 8.88 988183 .50 378629 9.42 6828697 45 22 9.386386 8.88 988183 .50 378629 9.42 6828697 45 22 9.386386 8.88 988183 .50 378629 9.42 6828697 45 22 9.386386 8.88 988183 .50 378629 9.42 6828697 45 22 9.386386 8.88 988183 .50 378629 9.42 6828697 45 22 9.386386 8.89 9.886183 .50 378629 9.42 6828697 45 23 9.386386 8.89 9.886183 .50 378629 9.42 6828697 45 24 9.386486 8.87 9.886183 .50 378629 9.42 6828697 45 25 386486 8.89 9.886183 .50 378629 9.42 6828697 45 26 386486 8.89 9.886183 .50 378629 9.42 6828697 45 27 386486 8.89 9.896882 .50 386884 9.93 10.668897 10.66829 10.66828 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682 10.6682	1		9.12	.988695					
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\$.364315 9.06 .986578 50 .366237 9.55 .633763 55 .635686 9.05 .9865819 54 .366810 9.53 .6336130 54 .866810 9.06 .986819 54 .366824 9.52 .633047 52 .5268110 10 .367524 9.00 .986440 .48 .366824 9.52 .633047 52 .5268110 10 .367524 9.00 .986440 .48 .366824 9.52 .633047 52 .52681476 10 .367524 9.00 .986440 .48 .366824 9.52 .633047 52 .52681476 10 .367524 9.00 .986440 .48 .366824 9.52 .633047 52 .52681476 11 .368603 8.96 .986813 .50 .373807 9.47 .622633 46 .262768 14 .356072 8.95 .986822 .50 .373807 9.47 .622633 46 .262768 16 .360762 8.95 .986822 .50 .373807 9.47 .622633 46 .262768 16 .360762 8.95 .986822 .50 .373809 9.43 .622607 44 .26283 46 .36282 8.99 .986813 .50 .374193 9.40 .628637 42 .26283 14 .26283 15 .362828 8.99 .986813 .50 .374193 9.40 .628637 42 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26283 14 .26	8								
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19	18	.361822	8.92			373629		.626871	42
21 9.363422 8.88 9.968108 50 9.375319 9.37 6.024119 38 22 9.363464 8.85 9.89073 50 377063 9.35 6.02528 37 24 305465 8.85 9.89033 50 377063 9.35 6.02528 37 25 365466 8.83 9.89033 50 377063 9.35 6.02528 37 26 366775 8.82 9.67933 50 377632 9.32 6.02528 37 27 336404 8.82 9.67933 50 377632 9.32 6.02417 38 28 367131 8.78 9.67922 50 376429 9.30 6.02473 34 28 367131 8.77 9.67802 50 377977 9.28 6.02033 31 29 367459 8.77 9.67802 50 377977 9.28 6.02033 31 29 386761 8.75 9.67771 50 381466 9.27 10.61000 29 32 38333 3.896761 8.75 9.67771 50 381466 9.27 10.61000 29 32 373180 8.75 9.67770 50 382020 9.25 6.1780 23 34 370285 8.72 9.67740 50 382020 9.25 6.1780 23 35 373180 8.70 9.67649 50 383089 9.22 6.1818 24 37 371852 8.70 9.67649 50 383089 9.22 6.16671 25 36 373284 8.66 9.67649 50 383089 9.20 6.16776 23 38 372894 8.67 9.67649 50 383089 9.20 6.16716 25 38 373414 8.65 9.67586 50 384884 9.20 6.16716 25 38 373414 8.65 9.67586 50 384884 9.20 6.16168 24 41 9.37308 8.65 9.67586 50 383689 9.17 6.161012 20 41 9.37508 8.69 9.67586 50 383689 9.17 6.161112 20 42 377452 8.68 9.67465 52 385687 9.18 6.16468 21 43 374670 8.62 9.67586 50 385688 9.17 6.161112 20 44 375467 8.62 9.67546 52 385687 9.18 6.16468 21 44 377467 8.62 9.67546 52 385687 9.15 6.161112 20 47 377698 8.69 9.67465 52 385687 9.15 6.161112 20 47 377698 8.69 9.67465 52 385687 9.15 6.161112 20 47 377698 8.69 9.67465 52 385687 9.15 6.161112 20 48 377450 8.62 9.67465 52 385687 9.15 6.161112 20 47 377698 8.69 9.67465 52 385687 9.15 6.161112 20 47 377698 8.69 9.67465 52 385687 9.15 6.16161 16 48 377549 8.67 9.67715 52 385687 9.15 6.16468 21 48 377549 8.67 9.67715 52 385687 9.15 6.16468 21 49 379608 8.57 9.67715 52 385687 9.15 6.16468 21 48 377549 8.69 9.67715 52 385687 9.18 6.16468 21 49 379608 8.57 9.67716 52 385688 9.17 6.161112 20 47 377698 8.69 9.67715 52 385688 9.17 6.161112 20 47 377698 8.60 9.67715 52 385688 9.17 6.161112 20 48 377467 8.62 9.67716 52 385688 9.17 6.161112 20 48 377467 8.62 9.67716 52 385688 9.17 6.161616 60 48 377649 8.69 9.67716 52 385688 9.17 6.161616 60 48 37	19	.362356	8.90	.988163		.374193		.625807	
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28	270		8.82	.957903	.52		9.82	.021878	99
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31 9.388711 8.75 9.987801 .50 9.380910 9.27 10.619090 29 32 .389286 8.75 .987771 .52 .381466 9.23 .61834 28 34 .370285 8.72 .987710 .50 .382920 9.23 .618789 .7 36 .370285 8.72 .987679 .52 .383129 9.23 .618871 .25 36 .371850 8.70 .987649 .50 .383682 9.20 .616318 24 37 .371852 8.68 .987588 .52 .384234 9.20 .616318 24 38 .372273 8.68 .987586 .52 .384766 9.18 .616631 21 40 .373414 8.67 .987586 .52 .385888 9.18 .614663 21 42 .374452 8.63 .987446 .52 .386489 9.17 10.611562 19		.368185	8.77	.987832		.380354			30
382 3692266 8.75 967771 .52 381466 9.23 618584 28 34 .370285 8.72 .96770 .50 382875 9.23 617980 27 35 .370285 8.72 .96770 .50 382875 9.23 .6167980 27 36 .371380 8.70 .967619 .52 .883129 9.23 .616871 26 37 .371850 8.70 .967618 .52 .884284 9.20 .616318 24 38 .372273 8.68 .967585 .52 .384384 9.20 .616318 24 40 .373414 8.65 .967585 .52 .38588 9.18 .614663 21 41 9.373993 8.65 .967495 .52 .385888 9.17 10.613562 19 42 .374452 8.65 .967495 .52 .385888 9.17 10.61412 20 43	21			U.		[]		10 610000	90
33 .369761 8.72 .967740 .50 .3889090 9.25 .617960 27 34 .370806 8.72 .967710 .50 .388975 9.25 .617425 26 35 .370808 8.70 .987679 .50 .883129 9.23 .616871 25 36 .371380 8.70 .987618 .50 .884284 9.20 .615766 23 38 .372873 8.68 .967585 .50 .384786 9.20 .615214 22 40 .373414 8.67 .987526 .52 .385337 9.18 .614681 24 41 9.373928 8.65 .987526 .50 .385888 9.17 .614112 20 42 .374452 8.63 .987415 .52 .3859687 9.15 .614112 20 44 .375497 8.62 .987415 .52 .386964 9.13 .612464 17 44 </td <td>82</td> <td></td> <td></td> <td></td> <td>.50</td> <td></td> <td></td> <td>618584</td> <td></td>	82				.50			618584	
34 370285 8.72 .967710 .50 382575 9.23 .617425 28 36 .370806 8.70 .987649 .50 .883129 9.23 .618871 25 36 .371850 8.70 .987649 .50 .884824 9.20 .616318 24 37 .371852 8.68 .987588 .52 .384766 9.20 .616318 24 39 .372894 8.67 .987586 .52 .3848766 9.18 .614663 21 40 .373414 8.65 .987496 .52 .385888 9.18 .614663 21 41 9.373893 8.65 .987496 .52 .986488 9.17 10.613522 19 42 .374452 8.65 .987496 .52 .986489 9.15 .613013 18 43 .374970 8.63 .987494 .52 .386983 9.15 .613013 18 45 <td></td> <td>.369761</td> <td></td> <td>.987740</td> <td>.52</td> <td>.382020</td> <td>9.23</td> <td>.617980</td> <td>27</td>		.369761		.987740	.52	.382020	9.23	.617980	27
36 .371830 8.70 .987649 50 .889682 9.20 .618318 24 37 .371852 8.68 .987586 .50 .384834 9.20 .618318 24 38 .372894 8.68 .987586 .50 .384836 9.20 .618318 24 39 .372894 8.68 .987587 .52 .385888 9.18 .614643 21 40 .373414 8.65 .987586 .52 .385888 9.18 .614628 21 42 .374452 8.65 .987496 .52 .986438 9.17 10.613562 19 42 .374452 8.65 .987496 .52 .986438 9.15 .614043 12 43 .374970 8.62 .987494 .52 .386984 9.13 .611369 15 44 .375487 8.60 .987312 .52 .386984 9.12 .611369 16 45 <td></td> <td>.370285</td> <td></td> <td>.987710</td> <td></td> <td>.882575</td> <td>9.20</td> <td>.617425</td> <td>26</td>		.370285		.987710		.882575	9.20	.617425	26
86 .371280 8.70 .987631 .52 .889632 9.20 .615786 23 38 .372873 8.68 .987586 .50 .384234 9.20 .615766 23 39 .372894 8.68 .987587 .52 .384337 9.18 .61468 21 40 .373893 8.65 .987526 .52 .385888 9.17 .614112 20 41 9.373893 8.65 .987495 .52 .385888 9.17 10.613562 19 42 .37452 8.63 .987495 .52 .386987 9.15 .614112 20 43 .374970 8.62 .987495 .52 .386984 9.15 .612913 19 44 .375487 8.60 .987372 .52 .386984 9.12 .611369 15 45 .376003 8.60 .987372 .52 .389178 9.12 .610822 14 47 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>9.22</td> <td></td> <td></td>							9.22		
38 .372373 8.68 .967588 .52 .384786 9.20 .615014 22 39 .372894 8.68 .967587 .52 .384786 9.18 .616463 21 40 .373414 8.65 .967586 .52 .385888 9.18 .614112 20 41 9.373893 8.65 9.987496 .52 .386888 9.17 .1611312 20 42 .374452 8.63 .957414 .52 .386987 9.15 .612013 18 43 .374970 8.62 .957414 .52 .386984 9.13 .611913 16 44 .375603 8.60 .957372 .52 .386981 9.12 .6119013 16 45 .377603 8.60 .957372 .52 .388681 9.12 .611369 16 46 .377619 8.57 .95729 .52 .389734 9.10 .610622 14 47 </td <td>36</td> <td></td> <td></td> <td></td> <td>.52</td> <td>.383682</td> <td></td> <td></td> <td>24</td>	36				.52	.383682			24
39 373694 8.867 .967557 .52 .385888 9.18 .614668 21 40 .373414 8.65 .987595 .50 .385888 9.17 .614668 21 41 9.373938 8.65 9.987496 .52 .385888 9.15 .614112 20 42 .374452 8.63 .957495 .52 .386987 9.15 .613013 18 43 .374970 8.62 .957494 .52 .386984 9.13 .611030 18 44 .375487 8.60 .957372 .52 .3869178 9.12 .611916 16 45 .37603 8.60 .957312 .52 .3869178 9.12 .611369 14 47 .377649 8.57 .95729 .52 .389734 9.10 .610276 13 48 .377549 8.57 .95729 .52 .390270 9.08 .609185 11 50 <td></td> <td>379979</td> <td>8.68</td> <td></td> <td>.50</td> <td></td> <td>9.20</td> <td></td> <td>28</td>		379979	8.68		.50		9.20		28
40 .373414 8.86 9.967526 .50 .385888 9.15 .614112 20 41 9.373893 8.65 9.967496 .52 9.386498 9.15 .613013 18 42 .374452 8.63 .967445 .52 .886967 9.15 .613013 18 43 .374970 8.62 .967445 .52 .886967 9.15 .613013 18 44 .375487 8.60 .96732 .52 .386831 9.12 .611369 15 46 .376519 8.60 .96732 .52 .386831 9.12 .611369 15 46 .376519 8.60 .96732 .52 .386831 9.12 .611369 15 47 .377065 8.60 .96734 .52 .389734 9.10 .610362 14 47 .377065 8.57 .967248 .52 .389634 9.10 .610262 14 48 .377549 8.57 .967248 .52 .389630 9.06 .606640 10 50 .378577 8.53 .967248 .52 .390270 9.08 .609730 12 49 .376063 8.57 .967248 .52 .390210 9.08 .609730 12 50 .378677 8.53 .967248 .52 .390815 9.08 .600864 10 51 9.379069 8.58 .967155 .52 .3902407 9.06 .606640 10 51 9.379069 8.58 .967155 .52 .3902447 9.07 .607553 88 53 .390113 8.53 .967124 .52 .392999 9.03 .607601 55 53 .390113 8.53 .967124 .52 .392999 9.03 .607601 55 54 .39024 8.59 .967061 .52 .394073 9.02 .607653 85 55 .381134 8.48 .967060 .53 .394614 9.00 .606469 6 55 .381364 8.48 .967060 .53 .394614 9.00 .606486 55 56 .381643 8.48 .967060 .53 .394614 9.00 .606486 6 57 .383168 8.45 .969967 .52 .395604 9.00 .604946 35 58 .389561 8.45 .969967 .52 .395604 9.00 .604946 35 58 .389561 8.45 .969967 .52 .395604 9.00 .604946 35 59 .383168 8.45 .969967 .52 .395604 8.96 .606767 1 10.608229 0	80								
41 9.373983 8.65 9.967496 5.2 9.386438 9.15 10.618562 19 42 .374452 8.63 9.57445 5.2 386987 9.15 618013 18 43 374970 8.62 9.57445 5.2 386984 9.13 611916 16 45 .376003 8.60 9.5732 5.2 386984 9.13 611916 16 45 .376003 8.60 9.5732 5.2 386984 9.13 611916 16 46 .3776519 8.60 9.57341 5.2 389178 9.10 610222 14 47 .377085 8.57 9.5729 5.2 389270 9.10 610276 13 48 .377649 8.57 9.5729 5.2 389270 9.10 610276 13 49 .373083 8.57 9.5729 5.2 389270 9.10 610276 13 49 .373083 8.57 9.5729 5.2 389270 9.0 610276 13 50 .378577 8.55 9.5717 5.3 391360 9.08 6009185 11 50 .378577 8.55 9.967186 5.5 391360 9.08 6009185 11 51 9.379090 8.53 9.967186 5.2 9.391903 9.05 606640 11 51 9.379084 8.59 9.967186 5.2 3892447 9.07 607553 8 53 .389118 8.52 9.97124 5.3 382447 9.07 607553 8 54 .380624 8.50 9.967062 5.2 3808381 9.03 600701 9 55 .381184 8.52 9.97124 5.3 382899 9.03 600701 9 55 .381184 8.58 9.967080 5.2 380801 9.08 6009185 15 56 .38184 8.48 9.96906 5.3 384073 9.02 6005927 5 57 .382152 8.48 9.96906 5.3 384073 9.0 600469 6 58 .382618 8.48 9.96906 5.3 384014 9.02 6005896 4 57 .382152 8.48 9.96906 5.3 385238 8.96 6003767 1 59 .383168 8.45 9.96906 5.3 385223 8.96 6003767 1 59 .383168 8.45 9.966967 5.2 385623 8.96 6003767 1 50 .383675 8.45 9.966966 5.3 385623 8.96 6003767 1									
42 374452 8.63 .967415 .52 .866867 9.15 .613013 18 43 .374970 8.63 .987414 .52 .857586 9.13 .611916 16 44 .375487 8.60 .987413 .52 .389084 9.12 .611916 16 45 .376019 8.60 .987372 .52 .389734 9.12 .611399 15 47 .3776619 8.60 .987310 .52 .389724 9.10 .610276 18 48 .377649 8.57 .98729 .52 .389724 9.10 .600730 12 49 .378068 8.57 .987217 .52 .390180 9.08 .609185 11 50 .378677 8.57 .987217 .52 .391800 9.05 .606640 1 51 9.379608 8.59 .987127 .52 .392407 9.07 .607553 8 52	41	0 378088		9 087498		0.998498		10 618569	10
43	42		8.65		.52				
44 375467 8.02 987408 0.02 388064 9.12 611916 16 45 376008 8.60 987372 52 388681 9.12 611869 15 46 376519 8.60 987341 52 388681 9.12 611869 15 47 377085 8.57 987279 52 389724 9.10 610222 14 48 377649 8.57 987279 52 389270 9.10 610276 13 49 378068 8.57 98728 52 380270 9.06 600730 12 49 378068 8.57 98728 52 380815 9.08 600780 12 50 378577 8.53 98718 52 39180 9.08 600864 11 51 9-379069 8.58 9.967186 52 9.891903 9.05 600864 11 52 378061 8.52 987124 53 39289 9.03 607511 7 53 380118 8.52 987124 53 39289 9.03 607011 7 54 380624 8.50 987082 53 39289 9.03 607011 7 55 381184 8.52 987124 53 39289 9.03 607011 7 55 381184 8.52 987090 52 383881 9.03 607011 7 56 381643 8.48 980908 53 384614 9.02 605896 55 381844 8.48 980908 53 384614 9.02 605896 55 381864 8.48 986908 53 385154 9.00 604896 55 382158 8.48 986908 53 385154 9.00 604896 55 383168 8.45 986967 52 385623 8.96 600777 1 60 9.383675 8.45 9.966966 53 386223 8.96 600777 1	43	.874970		987434	1 .5%	.387536		.612464	17
1.5	44	.375487	8.60	.987403	59	.388084		.611916	16
467 .377085 8.60 .957310 .52 .389724 9.10 .6102276 13 48 .377089 8.57 .987279 .52 .390270 9.10 .610276 13 49 .37808 8.57 .987279 .52 .390815 9.08 .609138 11 50 .378577 8.53 .987217 .53 .391360 9.05 .609640 10 51 9.379069 8.53 .967155 .52 .392447 9.07 10.606097 9 52 .390113 8.53 .967124 .52 .392447 9.03 .607583 8 53 .390113 8.53 .967124 .52 .392899 9.03 .607011 7 54 .390234 8.52 .967081 .52 .392473 9.03 .607011 7 54 .380124 8.46 .967061 .52 .394073 9.03 .605275 5 56	45		8.60		.52			.611369	
48 .377649 8.57 .987248 .52 .390270 9.08 .609730 12 .50 .378677 8.58 .987218 .52 .390815 9.08 .609185 12 .50 .378677 8.58 .987217 .53 .390815 9.08 .609185 12 .50 .378677 8.58 .987185 .52 .390816 9.06 .608840 10 .51 9.379601 8.58 .987185 .52 .392447 9.07 .607553 8.51 9.379601 8.58 .987185 .52 .392447 9.03 .607011 7.54 .380284 8.52 .987082 .53 .39381 9.03 .607011 7.54 .380284 8.50 .987082 .53 .39381 9.03 .607011 7.55 .55 .381184 8.46 .987081 .52 .394073 9.02 .605827 .55 .55 .381184 8.48 .987080 .53 .394614 9.00 .606886 4.57 .382152 8.48 .986986 .53 .393615 9.08 .608469 8.58 .389861 8.48 .986986 .53 .393614 9.00 .60886 4.57 .382152 8.48 .986986 .53 .395614 9.00 .604846 3.58 .383661 8.45 .986986 .52 .395694 9.00 .604806 2.58 .383868 8.45 .986986 .53 .396233 8.98 .603767 1.50 .9883675	46		8.60		.52		9.10		
49 378068 8.57 .987248 .52 .390815 9.08 .609185 11 50 .378677 8.53 .987217 .52 .391860 9.06 .608640 10 51 9.379069 8.58 9.967186 .52 9.391903 9.07 10.608097 9 53 .380118 8.52 .987124 .52 .39299 9.03 .607513 8 .60711 7 54 .380624 8.50 .987092 .52 .393831 9.03 .607499 6 55 .381184 8.48 .987090 .52 .394073 9.02 .605892 56 .381643 8.48 .986966 .52 .395154 9.00 .604846 3 58 .382651 8.48 .986967 .52 .395694 9.00 .604806 2 59 .383168 8.45 .986967 .52 .395694 9.00 .604806 2			8.57		.52		9.10	010670	
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51 9·379089 8·58 9·987186 .52 9·391903 9·07 10·608097 9 52 3.79011 8·58 987155 .52 392447 9·07 607553 8 53 380118 8·52 987124 .52 392989 9·03 607011 7 54 380624 8·50 987092 .53 393581 9·03 608469 6 55 381184 8·48 987090 .52 384073 9·02 605827 5 56 381643 8·48 986906 .53 385154 9·00 604846 6 57 382152 8·48 986906 .52 385644 9·00 604846 58 389561 8·45 986967 .52 386364 9·0 604846 59 383168 8·45 986965 .52 386233 8·96 603767 1 60 9.388675 8·45 986904		378577	8.57		.52				
52 379601 8.53 .967155 .52 .392447 9.03 .607583 8 53 .380113 8.52 .987124 .52 .392969 9.03 .607011 7 54 .380624 8.50 .987092 .53 .3938381 9.03 .606469 6 55 .381184 8.48 .987090 .52 .394073 9.02 .605827 5 56 .381643 8.48 .986996 .53 .394614 9.00 .604396 6 57 .383158 8.48 .986967 .52 .395694 9.0 .604946 3 58 .382561 8.45 .986967 .52 .395694 8.96 .603767 1 60 9.383675 8.45 .986966 .53 .386223 8.96 .603767 1 60 9.383675 8.45 .986904 .53 .986223 8.96 .603767 1		1				11		1	
53 .380118 8.52 .967124 .52 .392969 9.03 .607011 7 54 .380624 8.52 .987092 .52 .393581 9.03 .60469 6 55 .381184 8.48 .987061 .52 .394073 9.03 .608469 6 56 .381648 8.48 .987080 .52 .394614 9.00 .60386 4 57 .882152 8.48 .986967 .52 .395694 9.00 .604846 3 58 .393661 8.45 .986967 .52 .395694 9.08 .604906 2 59 .383168 8.45 .986967 .52 .395694 8.96 .604906 2 60 9.388675 8.45 .986904 .53 .396233 8.98 .604306 2 9.986975 .52 .396271 8.97 10.603239 0									8
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50 .3811643 8.48 .987090 .52 .384173 9.02 .003827 5 56 .381643 8.48 .987080 .53 .384614 9.00 .605386 4 57 .383152 8.48 .986986 .52 .395644 9.00 .604846 3 59 .383168 8.45 .986987 .52 .396644 8.96 .603767 1 60 9.383675 8.45 9.966904 .53 9.386771 8.97 10.603229 0	54	.380624		.987092		.393531		.606469	6
50 .381043 8.48 .969908 .53 .384014 9.00 .003504 57 .382152 8.48 .969908 .52 .385154 9.00 .604846 3 58 .382661 8.45 .969967 .52 .395694 8.98 .604306 2 59 .383168 8.45 .969966 .52 .396233 8.98 .603767 1 60 9.383675 8.45 9.986904 .53 9.396771 8.97 10.603229 0	55								5
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59 .383168 8.45 .986966 .52 .396223 8.96 .603707 1 60 9.383675 8.45 9.986904 .53 9.396771 8.97 10.603229 0	57		8.48		.52		9.00		3
60 9.888675 8.45 9.986904 .53 9.896771 8.97 10.608229 0	50		8.45	NOUNO!	.52				î
	60		8.45	9.986904	.53		8.97		
' Cosine. D. 1". Sine. D. 1". Cotang. D. 1". Tang. '	_					l'			-
	L′	Cosine.	D. 1'.	Sine.	D. 1'.	Cotang.	D. 1'.	Tang.	1 '

14°			o, IANGE	м16, А	ND COTAL	NGENT	o.	10	4
,	Sine.	D. 1".	Cosine.	D. 1*.	Tang.	D. 1'.	Cotang.	1.	
0	9.383675	8.45	9.986904	.52	9.396771	8.97	10.608229	60	-
1	.384182	8.42	.986873	.53	.397309	8.95	.602691	59	
2	.384687	8 49	.986841	.58	.397846 .398383	8.95	.602154	58	
8	.385192	8.42	.986809	.52	.398919	8.98	.601617 .601081	57 56	
5		8.40	.986746	.53	.399455	8.98	.600545	55	
6	.386704	8.38 8.38	.986714	.58	.399990	8.92 8.90	.600010	54	
7	.387207	8.37	.986683	.58	.400524	8.90	.599476	53	
8		8.35	.986651 .986619	.53	.401058 .401591	8.88	.598942 .598409	52	
10		8.35	.986587	.58	402124	8.88	.597876	51 50	
	9.389211	8.33	9.986555	.53	9.402656	8.87		1	
11 12		8.33	.986523	.53	.403187	8.85	10.597344 .596813	49 48	
13		8.32	.986491	.58	.403718	8.85	.596282	47	- 1
14		8.30 8.30	.986459	.53	.404249	8.85 8.82	.595751	46	
15		8.28	.986427	.53	.404778	8.88	.595222	45	
16	.391703	8.27	.986395	.53	.405308	8.80	.594692	44	1
17	.392199 .392695	8.27	.986363 .986331	.53	.405836	8.80	.594164 .598636	43 42	1
1 19	.393191	8.27	.986299	.53	406892	8.80	.593108	41	
20	. 393685	8.23 8.23	.986266	.55 .53	.407419	8.78 8.77	.592581	40	- 1
21	9.394179	1	9.986234	1	9.407945	1	10.592055	39	-
22	.394673	8.23 8.22	.986202	.58	.408471	8.77 8.75	.591529	38	1
23	.395166	8.20	.986169	.55 .53	.408996	8.75	.591004	37	ı
24	.895658	8.20	.986137	.55	.409521	8.78	.590479	36	1
25 26	.396150 .396641	8.18	.986104	.53	.410045	8.78	.589955 .589431	85 84	1
27	.397132	8.18	.986039	.55	.411092	8.72	.588908	33	١
1 28	.397621	8.15 8.17	.986007	.53 .55	.411615	8.72 8.70	.588385	82	ı
29	.398111	8.15	.985974	.53	.412137	8.68	.587863	31	1
80	.398600	8.13	.985942	.55	.412658	8.68	.587342	30	1
31	9.399088	8.12	9.985909	.55	9.413179	8.67	10.586821	29	1
32 33	.399575 .400062	8.12	.985876 .985843	.55	.413699	8.67	.586301	28	ı
34	.400549	8.12	.985811	.53	.414738	8.65	.585781 .585262	27 26	ı
35	.401035	8.10	.985778	.55	.415257	8.65	.584743	25	1
36	.401520	8.08 8.08	.985745	.55	.415775	8.63 8.68	.584225	24	1
87	.402005	8.07	.985712	.55	.416293	8.62	.583707	23	1
38	.402489	8.05	.985679 .985646	.55	.416810 .417326	8.60	.583190 .582674	22	ı
40	.403455	8.05	.985613	.55	.417842	8.60	.582158	21	1
41	9.403938	8.05	9.985580	.55	9.418358	8.60	10.581642	1	ı
42	.404420	8.03	.985547	.55	.418873	8.58	.581127	19 18	ı
43	.404901	8.02	.965514	.55	.419387	8.57	.580613	17	ı
44	.405382	8.02 8.00	.985480	.57 .55	.419901	8.57 8.57	.580099	16	ı
45	.405862	7.98	.985447	.55	.420415	8.55	.579585	15	l
46	.406341	7.98	.985414 .985381	.55	.420927	8.55	.579073 .578560	14	ı
48	.407299	7.98	.985347	.57	.421952	8.58	.578048	13 12	ı
49	.407777	7.97	.985314	.55	.422463	8.52	.577587	iĩ	1
50	.408254	7.95 7.95	.985280	.57 .55	.422974	8.52 8.50	.577026	10	ı
51	9.408731	7.93	9.985247	.57	9.423484	8.48	10.576516	9	
52 53	.409207	. 7.93	.985213 .985180	.55	.428993 .424503	8.50	.576007	8	l
54	.409682 .410157	7.92	.985160	.57	.424503	8.47	.575497 .574989	7	
55	.410632	7.92	.985113	.55	.425519	8.47	.574481	5	ĺ
56	.411106	7.90 7.88	.985079	.57 .57	.426027	8.47 8.45	.573973	4	
57	.411579	7.88	.985045	.57	.426534	8.45	.578466	8	
58 59	.412052 .412524	7.87	.985011 .984978	.55	.427041 .427547	8.43	.572959 .572453	2	
60	9.412996	7.87	9.984944	.57	9.428052	8.42	10.571948	ō	
' 5	Cosine.	D. 1'.	Sine.	D. 1°.	Cotang.	D. 1'.	Tang.	,	
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15°		IADI	UI4 A 1	DOGAIL	III MIO	31111109		164
,	Sine.	D. 1*.	Cosine.	D. 1*.	Tang.	D. 1*.	Cotang.	,
0	9.412996	7.85	9.984944	.57	9.428052	8.43	10.571948	60
1	.413467	7.85	.984910	.57	.428558	8.40	.571442	59
8	.418938	7.83	.984876	.57	.429062 .429566	8.40	.570988 .570484	58 57
4	.414408	7.88	.984842	.57	430070	8.40	.569930	56
5	.415847	7.82	.984774	.57	430578	8.38	.569427	55
6	.415815	7.80	.984740	.57 .57	.431075	8.37 8.37	.568925	54
7	.416283	7.80	.984706	.57	.481577	8.37	.568423	53
8	.416751 .417217	7.77	.984672 .984638	.57	.432079 .432580	8.85	.567921 .567420	52
10	.417684	7.78	.984608	.58	433080	8.33	.566920	50
	9.418150	7.77	9.984569	.57	9.433580	8.33	10.566420	49
11 12	.418615	7.75	.984535	.57	.434080	8.38	.565920	48
13	.419079	7.73	.984500	.58	.434579	8.82	.565421	47
14	.419544	7.75 7.72	.984466	.57 .57	.435078	8.32 8.30	.564922	46
15	.420007	7.72	.984432	.58	.435576	8.28	.564424	45
16	.420470	7.72	.984397	.57	.436078	8.28	.568927 .568430	44
17 18	.420933 .421895	7.70	.984368	.58	.436570	8.28	562933	43
19	.421857	7.70	.984294	.57	.437563	8.27	.562437	41
20	.422318	7.68 7.67	.984259	.58 .58	.488059	8.27 8.25	.561941	40
21	9.422778		9.984224		9.438554		10.561446	39
22	.423238	7.67	.984190	.57	.439048	8.23	.560952	38
23	.423697	7.65 7.65	.984155	.58 .58	.439548	8.25 8.22	.560457	37
24	.424156	7.65	.984120	.58	.440036	8.22	.559964	36
25 26	.424615 .425073	7.63	.984085 .984050	.58	.440529	8.22	.559471 .558978	35
27	.425530	7.62	.984015	.58	.441514	8.20	.558486	34 38
28	425987	7.62	.983981	.57	.442006	8.20	.557994	32
29	.426443	7.60 7.60	.988946	.58 .58	.442497	8.18 8.18	.557508	81
80	.426899	7.58	.983911	.60	.442988	8.18	.557012	30
81	9.427354	7.58	9.983875	.58	9.448479	8.15	10.556521	29
32	.427809	7.57	.983840	:58	.448968	8.17	.556032	28
33 34	.428263	7.57	.983805	.58	.444458	8.15	.555542 .555058	27 26
85	429170	7.55	.983735	.58	445435	8.13	.554565	25
36	.429623	7.55	.983700	.58	.445923	8.13	.554077	24
37	.430075	7.53 7.53	.983664	.60	.446411	8.13 8.19	.553589	23
38	.430527	7.52	.983629	:58	.446898	8.10	.553102	22
89 40	.430978 .431429	7.52	.983594 .983558	.60	.447384	8.10	.552616 .552130	21 20
		7.50	11	.58	11	8.10		1
41 42	9.431879	7.50	9.983523 .983487	.60	9.448356	8.08	10.551644 .551159	19
48	.432778	7.48	.983452	.58	.449826	8.08	.550674	18 17
44	.433226	7.47	.983416	.60	.449810	8.07	.550190	16
45	.433675	7.48 7.45	.983381	.58 .60	.450294	8.07 8.05	.549706	15
46	.434122	7.45	.983345	.60	.450777	8.05	.549223	14
47 48	. 434569 . 435016	7.45	. 983309 . 983273	.60	.451260	8.05	.548740 .548257	13
49	.435462	7.48	.988238	.58	452225	8.08	.547775	11
50	.435908	7.48	.983202	.60	.452706	8.02	.547294	10
51	9.436353	7.42	9.968166	.60	9.453187	8.02	10.546818	9
52	.436798	7.48	.988130	.60	.453668	8.02	546332	
53	.437242	7.40 7:40	.983094	.60 .60	.454148	8.00 8.00	.545852	8 7 6
54	.437686	7.38	.983058	.60	.454628	7.98	.545872	6
55 56	. 438129 . 438572	7.88	.983022 .982986	.60	.455107 .455586	7.98	.544898 .544414	5
57	.439014	7.87	.982950	.60	.456064	7.97	.543936	3
58	.439456	7.37	.982914	.60	.456542	7.97	.543458	2
59	.439897	7.35 7.35	.982878	.60 .60	.457019	7.95 7.95	.542981	1
60	9.440338		9.982842		9.457496		10.542504	0
•	Cosine.	D. 1'.	Sine.	D. 1'.	Cotang.	D. 1'.	Tang.	1 '

16.	ge Cosines, Innuents, And Cotangents.										
,	Sine.	D. 1*.	Cosine.	D. 1*.	Tang.	D. 1".	Cotang.	'			
0	9.440838	~ 00	9.982842	·	9.457496		10.542504	60			
1	.440778	7.83 7.83	.982805	.62 .60	.457978	7.95 7.93	.542027	59			
2	.441218	7.83	.982769	.ãõ	.458449	7.93	.541551	58			
8	.441658	7.30	.982733 .982696	.62	.458925	7.92	.541075	57			
5	.442535	7.82	.982660	.60	.459400	7.92	.540600 .540125	56 55			
6	.442973	7.80	.982624	.60	.460349	7.90	.589651	54			
7	.448410	7.28 7.28	.982587	.62 .60	.460823	7.90	.589177	53			
8	.443847	7.28	.982551	.62	.461297	7.90 7.88	.588708	52			
9	.444284	7.27	.982514	.62	.461770	7.87	.538230	51			
10	.444720	7.25	.982477	.60	.462242	7.88	.587758	50			
11	9.445155	7.25	9.982441	.62	9.462715	7.85	10.537285	49			
12	.445590	7.25	.982404	.62	.468186	7.87	.536814	48			
18	.446025 .446459	7.23	.982367 .982331	.60	463658	7.83	.536842	47 46			
14 15	446898	7.23	982294	.62	.464128	7.85	.585872 .585401	45			
16	.447826	7.22	.982257	.62	.465069	7.83	.534931	44			
17	.447759	7.22 7.20	.982220	.62 .62	.465539	7.83 7.82	.534461	43			
18	.448191	7.20	.982183	.62	.466008	7.82	.588992	42			
19	.448623	7.18	.982146	.62	.466477	7.80	.533523	41			
20	.449054	7.18	.982109	.62	.466945	7.80	.533055	40			
21	9.449485	7.17	9.982072	.62	9.467418	7.78	10.582587	89			
22	.449915	7.17	.982085	.62	.467880	7.78	.582120	88			
23	450845	7.17	.981998	.62	.468847	7.78	.531658	37			
24 25	.450775 .451204	7.15	.981961 .981924	.62	.468814 .469280	7.77	.531186 .530720	36 35			
26	451682	7.13	.981886	.63	.469746	7.77	.530254	84			
27	452060	7.13 7.18	.981849	.62	.470211	7.75 7.75	.529789	33			
28	.452488	7.18	.981812	.62 .63	.470676	7.75	.529324	32			
29	.452915	7.12	.981774	.62	.471141	7.73	.528859	81			
80	.453342	7.10	.981737	.62	.471605	7.73	.528395	30			
81	9.453768	7.10	9.981700	.63	9.472069	7.72	10.527981	29			
82	.454194	7.08	.981662	.62	.472532	7.72	527468	28			
88	.454619 .455044	7.08	.981625 .981587	.63	.472995 .478457	7.70	.527005	27 26			
84 85	.455469	7.08	.981549	.63	473919	7.70	.526081	25			
86	.455898	7.07	.981512	.62	.474881	7.70	.525619	24			
37	.456316	7.05 7.05	.981474	.63 .63	.474842	7.68 7.68	.525158	23			
88	. 456739	7.05	.981436	.62	.475808	7.67	.524697	222			
39	.457162	7.08	.981899	.63	.475763	7.67	.524287	21			
40	.457584	7.03	.981361	.63	.476223	7.67	.528777	20			
41	9.458006	7.02	9.981828	.63	9.476688	7.65	10.528817	19			
42	.458427	7.02	.981285	.63	.477142	7.65	.522858	18			
43 44	.458848 .459268	7.00	.981247 .981209	.63	.477601 .478059	7.68	.522899 .521941	17 16			
44 45	.459688	7.30	.981171	.63	.478517	7.63	.521483	15			
46	.460108	7.00	.981188	.68	.478975	7.63	.521025	14			
47	.460527	6.98 6.98	.981095	.63 .63	.479432	7.62 7.62	.520568	18			
48	.460946	6.97	.981057	.63	.479889	7.60	.520111	12			
49	.461364	6.97	.981019	.63	.480345	7.60	.519655	11			
50	.461782	6.95	.980981	.65	.480801	7.60	.519199	10			
51	9.462199	6.95	9.980942	.63	9.481257	7.58	10.518748	9			
52	.462616	6.98	.960904	.63	.481712	7.58	.518288	8			
53 54	.463082 .463448	6.93	.980866 .980827	.65	.482167 .482621	7.57	.517888 .517879	7			
55	.463864	6.98	.980789	.63	488075	7.57	.516925	5			
56	.464279	6.92	.980750	.65	488529	7.57	.516471	4			
57	.464694	6.92 6.90	.980712	.63 .65	.488982	7.55 7.55	.516018	8			
58	.465108	6.90	.980673	.63	.484485	7.58	.515565	2			
59	. 465522	6.88	.980685	.65	.484887	7.53	.515118	1			
60	9.465985		9.980596		9.485339		10.514661	0			
,	Cosine.	D. 1'.	Sine.	D. 1'.	Cotang.	D. 1'.	Tang.	7			
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17°		IADD	H A. D	A. Bournillimite sinds,						
,	Sine.	D. 1'.	Cosine.	D. 1'.	Tang.	D. 1".	Cotang.	,		
0	9.465985		9.980596		9.485839		10.514661	60		
ĭ	.466348	6.88 6.88	.980558	.63 .65	.485791	7.53 7.52	.514209	59		
8	.466761	6.87	.980519	.65	.486242	7.52	.513758	58		
8	.467178	6.87	.980480	.63	.486693	7.50	.513307	57		
4	.467585 .467996	6.85	.980442	.65	.487143	7.50	.512857	56 55		
5 6	.468407	6.85	.980364	.65	.488043	7.50	.512407 .511957	54		
7	.468817	6.83	980325	.65	.488492	7.48	.511508	53		
8	.469227	6.83	.980286	.65 .65	.488941	7.48	.511059	52		
9	.469637	6.83 6.82	.980247	.65	.489390	7.48 7.47	.510610	51		
10	.470046	6.82	.980208	.65	.489638	7.47	.510162	50		
11	9.470455	6.80	9.980169	.65	9.490286	7.45	10.509714	49		
12	.470863	6.80	.980130	.65	.490733	7.45	.509267	48		
18	.471271	6.80	.980091	.65	.491180	7.45	.508820	47		
14	.471679	6.78	.980052 .980012	.67	.491627 .492073	7.43	.508373 .507927	46 45		
15 16	.472086 .472492	6.77	.979973	.65	.492519	7.43	.507481	44		
17	472898	6.77	.979934	.65	.492965	7.43	.507085	43		
18	.478804	6.77	.979895	.65 .67	.493410	7.42 7.40	.506590	42		
19	.478710	6.77 6.75	.979855	.65	.493854	7.42	.506146	41		
20	.474115	6.78	.979816	.67	.494299	7.40	.505701	40		
21	9.474519		9.979776		9.494743	7.38	10.505257	39		
22	.474923	6.78 6.78	.979737	.65 .67	.495186	7.40	.504814	38		
23	.475827	6.72	.979697	.65	.495630	7.38	.504370	371		
24	.475780	6.72	.979658	.67	.496073	7.37	.503927	36		
25 26	.476133 .476536	6.72	.979618 .979579	.65	.496515 .496957	7.37	.503485 .503043	35 34		
27	.476938	6.70	.979539	.67	.497399	7.37	.502601	33		
27 28	.477840	6.70	.979499	.67	.497841	7.37	.502159	32		
20	.477741	6.68 6.68	.979459	.67 .65	.498282	7.35 7.33	.501718	31		
80	.478142	6.67	.979420	.67	.498722	7.35	.501278	30		
81	9.478542	6.67	9.979380	.67	9.499163	7.33	10.500837	29		
82	.478942	6.67	.979340	.67	.499603	7.32	.500397	28		
88	.479342	6.65	.979800	.67	.500042	7.32	.499958	27		
84 85	.479741 .480140	6.65	.979260 .979220	.67	.500481 .500920	7.32	.499519 .499080	26		
36	.480589	6.65	.979180	.67	.501359	7.32	.499060	25 24		
87	480937	6.63	.979140	.67	.501797	7.30	.498203	23		
38	.481334	6.62	.979100	.67 .68	.502235	7.30 7.28	.497765	22		
89	.481731	6.62	.979059	.67	.502672	7.28	.497328	21		
40	.482128	6.62	.979019	.67	.503109	7.28	.496891	20		
41	9.482525	6.60	9.978979	.67	9.503546	7.27	10.496454	19		
42	.482921	6.58	.978939	.68	.503982	7.27	.496018	18		
48	.483316	6.60	.978898	.67	.504418	7.27	.495582	17		
41 45	.483712 .484107	6.58	.978858 .978817	.68	.504854 .505289	7.25	.495146 .494711	16 15		
46	.484501	6.57	.978777	.67	.505724	7.25	.494276	14		
47	.484895	6.57	.978737	.67	.506159	7.25	.493841	13		
48	. 485289	6.57 6.55	.978696	.68	.506593	7.23 7.23	.493407	12		
49	. 485682	6.55	.978655	.67	.507027	7.23	.492973	11		
50	. 486075	6.58	.978615	.68	.507460	7.22	.492540	10		
51	9.486467	6.55	9.978574	.68	9.507893	7.22	10.492107	9		
52	.486960	6.52	.978533	.67	.508326	7.22	.491674	8		
58 54	.487251	6.53	.978498 .978452	.68	.508759	7.20	.491241	8 7 6 5		
55	.488084	6.52	.978411	.68	.509191	7.18	.490809 .490378	2		
56	.488424	6.50	.978370	.68	.510054	7.20	489946	4		
57	.488814	6.50	978329	.68	.510485	7.18	.489515	8		
56 57 58 59	.489204	6.50 6.48	.978288	.68	.510916	7.18 7.17	.489084	2		
	.489598	6.48	.978247	.68	.511346	7.17	.488654	1		
60	9.489982		9.978206		9.511776		10.488224	0		
<i>,</i>	Cosine.	D 1'.	Sine.	D. 1'.	Cotang.	D. 1*.	Tang.	,		

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8.			, 11111011	,				161.
,	Sine.	D. 1*.	Cosine.	D. 1°.	Tang.	D. 1*.	Cotang.	$ \cdot $
0	9.489982		9.978206		9.511776		10.488224	60
ĭ	.490371	6.48	.978165	.68	.512206	7.17	.487794	59
2	.490759	6.47	.978124	.68 .68	.512635	7.15 7.15	.487365	58
8	.491147	6.47 6.47	.978083	.68	.513064	7.15	.486926	57
4	.491535	6.45	.978042	.68	.518498	7.13	.486507	56
5	.491922	6.48	.978001	:70	.513921	7.13	.486079	55
6	.492308	6.45	.977959	.68	.514349	7.18	.485651 .485223	54 53
8	.492695 .493081	6.43	.977918 .977877	.68	.514777 .515204	7.12	.484796	52
9	.493466	6.42	.977835	.70	.515631	7.12	.484369	51
10	.493851	6.42	.977794	.68	.516057	7.10	.483943	50
11	9.494236	6.42	9.977752	.70	9.516484	7.12	10.483516	49
12	.494621	6.42	.977711	.68	.516910	7.10	.483090	48
13	.495005	6.40	.977669	.70	.517335	7.08	482665	47
14	.495388	6.38	.977628	.68	.517761	7.10	482239	46
15	.495772	6.40	.977586	.70 .70	.518186	7.08 7.07	.481814	45
16	.496154	6.38	.977544	.68	.518610	7.07	.481390	44
17	.496537	6.37	.977508	:70	.519034	7.07	.480966	48
18	.496919	6.37	.977461	.70	.519458	7.07	.480542	42
19 20	.497301	6.35	.977419	.70	.519882	7.05	.480118 .479695	41 40
		6.35	11	.70		7.05		
21	9.498064	6.33	9.977335	.70	9.520728	7.05	10.479272	39
22 23	.498444	6.35	.977293	.70	.521151 .521578	7.03	.478849 .478427	38 37
24	.499204	6.32	.977209	.70	.521995	7.03	478005	36
25	.499584	6.33	.977167	.70	522417	7.08	.477583	35
26	.499963	6.32	.977125	.70	522838	7.02	.477162	34
27	.500342	6.32 6.32	.977083	.70 .70	.523259	7.02 7.02	.476741	33
28	.500721	6.30	.977041	:70	.523680	7.00	.476820	32
29	.501099	6.28	.976999	.70	.524100	7.00	.475900	81
80	.501476	6.30	.976957	.72	.524520	7.00	.475480	30
81	9.501854	6.28	9.976914	70	9.524940	6.98	10.475060	29
82	.502231	6.27	.976872	.70 .70	.525359	6.98	.474641	29 27
33 34	.502607 .502984	6.28	976830	.72	.525778	6.98	.474222 .473803	26
85	.503360	6.27	.976745	.70	.526615	6.97	473385	25
86	.503785	6.25	.976702	.72	.527033	6.97	.472967	24
87	.504110	6.25 6.25	.976660	.70 .72	.527451	6.95	.472549	23
88	.504485	6.25	.976617	72	.527868	6.95	.472182	22
39	.504860	6.23	.976574	.70	.528285	6.95	.471715 .471298	21
40	.505234	6.28	.976532	.72	11	6.95	,	20
41	9.505608	6.22	9.976489	.72	9.529119	6.93	10.470881	19
42	.505981	6.22	.976446	.70	.529535	6.98	.470465 .470049	18
43 44	.506354 .506727	6.22	.976404 .976361	.72	.530366	6.92	.469684	17
45	.507099	6.20	.976318	.72	.530781	6.92	469219	15
46	.507471	6.20	.976275	.72	.531196	6.92	.468804	14
47	.507843	6.20 6.18	.976232	.72	.581611	6.92	.468389	13
48	.508214	6.18	.976189	72	.532025	6.90	.467975	12
49	.508585	6.18	.976146	72	.532439	6.90	.467561	11
50	.508956	6.17	.976103	.72	.532853	6.88	.467147	10
51	9.509828	6.17	9.976060	.72	9.533266	6.88	10.466784	9
52 53	.509696	6.15	.976017	.72	.533679	6.88	.466321 .465908	8 7
54	.510065 .510434	6.15	.975974	.78	.534092 .584504	6.87	.465496	6
55	.510803	6.15	.975887	.72	.534916	6.87	.465084	5
56	.511172	6.15	.975844	.72	.535328	6.87	.464672	4
57	.511540	6.18 6.12	.975800	.78 .72	.535739	6.85	.464261	8
58	.511907	6.13	.975757	72	.536150	6.85	.468850	2
59 60	.512275 9.512642	6.12	.975714 9.975670	.78	.536561 9.536972	6.85	.463439 10.463028	1 0
	8.512042		8.819070		8.5508.2		10.4000020	
,	Cosine.	D. 1".	Sine.	D. 1'.	Cotang.	D. 1'.	Tang.	,
					_		-	

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9•	TABLE A.—LOGARITHMIC SINES,										
,	Sine.	D. 1*.	Cosine.	D. 1'.	Tang.	D, 1°.	Cotang.	,			
	9.512642		9.975670		9.536972		10.463028	60			
1	.513009	6.12	.975627	.72 .73	.587382	6.83	.462618	59			
2	.513375	6.10 6.10	.975583	.73	.537792	6.88 6.83	.462208	58			
3	.513741	6.10	.975589	.72	.538202	6.82	.461798	57			
4	.514107	6.08	.975496	.78	.538611	6.82	.461389	56			
5	.514472 .514837	6.08	.975452 .975408	.73	.539020	6.82	.460980 .460571	55 54			
7	.515202	6.08	.975365	.72	.539837	6.80	.460163	59			
ė	.515566	6.07	.975821	.73	.540245	6.80	.459755	53 52			
ğ	.515930	6.07	.975277	.73	.540653	6.80 6.80 6.78	.459847	51			
10	.516294	6.07 6.05	.975233	.73 .73	.541061	6.80	.458939	50			
11	9.516657		9.975189	1	9.541468		10.458532	49			
12	.517020	6.05	.975145	.73	.541875	6.78	.458125	48			
13	.517382	6.03	.975101	.73	.542281	6.77	.457719	47			
14	.517745	6.05 6.03	.975057	.73 .73	.542688	6.78	.457812	46			
15	.518107	6.02	.975013	73	.543094	6.75	.456906	45			
16	.518468	6.02	.974969	.73	.543499	6.77	.456501	44			
17	.518829	6.02	.974925	.75	.543905	6.75	.456095	48			
18 19	.519190	6.02	.974880	.73	.544310	6.75	.455690	42			
20	.519551 .519911	6.00	.974836	.73	.544715 .545119	6.73	.455285 .454881	41			
	1	6.00	1	.73	11	6.75		1			
21 22	9.520271	6.00	9.974748	.75	9.545524	6.73	10.454476	89			
23	.520631	5.98	.974708	.78	.545928	6.72	.454072	88 87			
24	.520990 .521349	5.98 5.98	.974659 .974614	.75	.546331	6.72 6.73	.453669 .453265	36			
25	.521707	5.97	.974570	.73	.547138	6.72	.452862	35			
96	.522066	1 5 022	.974525	.75	.547540	6.70	452460	34			
27 28 29	.522424	5.97	.974481	.78	.547943	6.72	452057	33			
28	.522781	5.95	.974436	.75	.548345	6.70	.451655	32			
29	.523138	5.95 5.95	.974391	.75 .73	.548747	6.70 6.70	.451253	81			
80	.523495	5.95	.974347	.75	.549149	6.68	.450851	30			
81	9.523852	1	9.974302	I	9.549550		10.450450	29			
82	.524208	5.93	974257	.75	.549951	6.68	.450049	98			
33	.524564	5.93 5.93	.974212	.75 .75	.550352	6.68	.449648	27 26			
84	.524920	5.92	.974167	.75	.550752	6.68	.449248	26			
85	.525275	5.92	.974122	.75	.551153	6.65	.448847	25			
36 37	.525630 .525984	5.90	.974077	.75	.551552	6.67	.448448 .448048	24			
88	.526339	5.92	.973987	.75	.551952 .552351	6.65	.447649	23 22			
39	.526698	5.90 5.88	973942	.75	.552750	6.65	.447250	21			
40	.527046	5.88	.973897	.75	.553149	6.65	.446851	20			
41	9.527400	5.90	9.973852	.75	9.553548	6.65	10.446452	19			
42	.527758	5.88	.973807	.75	.553946	6.63	.446054	18			
48	.528105	5.87	.973761	.77	.554344	6.63	.445656	17			
44	.528458	5.88	.973716	.75	.554741	6.62	.445259	16			
45	.528810	5.87 5.85	.973671	75	.555139	6.63 6.62	.444861	15			
46	.529161	5.87	.973625	.77 .75	.551536	6.62	.444464	14			
47	.529513	5.85	.973580	75	.555933	6.60	.444067	18			
48	.529864	5.85	.978535	.75	.556329	6.60	.443671	12			
49 50	.530215 .530565	5.83	.973489	.75	.556725	6.60	.448275 .442879	11 10			
		5.83	11	.77	.557121	6.60	l .				
51	9.530915	5.83	9.973398	.77	9.557517	6.60	10.442483	9			
52 53	.531265	5.82	.973352	.75	.557913	R 58	.442087	8			
54	.531614	5.82	.973307 .973261	.77	.558308	6.58	.441692 .441297	6			
55	.532312	5.82	.973201	.77	.558703	6.57	.440903	5			
56	.532661	5.82	.973169	.77	.559491	6.57	440509	4			
56 57	.533009	5.80	.973124	.75	.559885	6.57	.440115	8			
58	.533857	5.80	.973078	.77	.560279	6.57	.439721	2			
59	.533704	5.78 5.80	.978032	:77	.560673	6.57 6.55	.439827	1			
60	9.584052	0.00	9.972986	'''	9.561066	0.55	10.438934	0			
	Cosine.	D. 1'.	Gina	D 11	Coton	D 11	Tona	—			
•	COSIDE.	LD. F.	Sine.	D. 1'.	Cotang.	ι D. Γ'.	Tang.	, ,			

0.	COSINES, TANGENIS, AND COTANGENIS.										
,	Sine.	D. 1".	Cosine.	D. 1.	Tang.	D. 1".	Cotang.	,			
	9.534052		9.972986		9 561066		10.438934	60			
ĭ	534399	5.78	972940	.77	.561459	6 55 6 58	.438541	59			
	.534745	5.77	.972894	77	561851	6.55	.488149	58			
2 3	.535092	5.78	972848		562244	6.58	.487756	57			
4	.535438	5.77	972802	77	.562636	6.58	.487364	56			
5	535783	5.75	972755	! <u></u>	.568028	6.52	.486972	55			
6	.536129	5.77	.972709	77	568419	6 58	.436581	54			
7	.536474	5 75	.972668	.77	568811	6 52	.436189	53			
ġ.	.536818	5.78	972617	.77	.564202	6.52	.435798	52			
9	.537163	5.75	972570	.77	.564598	6 50	.485407	51			
10	.537507	5.78	.972524	:77	.564988	6.50	.485017	50			
11	9.537851	5.73	9.972478		9.565878		10.484627	49			
12	538194	5.72	972481	.78	565768	6.50	.484287	48			
13	538538	5.78	972885	.77	.566158	6.50	483847	47			
	538880	5.70	972888	.78	566542	6.48	.488458	46			
14 15	.539223	5.72	972291	.78	.566982	6.50	.483068	45			
16	539565	5.70	.972245	77	.567320	6.47	.482680	44			
17	539907	5.70	972198	.78	567709	6.48	.482291	43			
18	.540249	5.68	.972151	.78	.568098	6.48	.481902	42			
	.540590	5.68	.972105	.77	.568486	6.47	.481514	41			
19 20	.540931	5.68	.972058	.78	.568873	6.45	.481127	40			
20	.040931	5.68		.78		6.47					
21	9.541272	5.68	9.972011	.78	9.569261	6.45	10.430739	39 38			
22	.541618	5.67	.971964	.78	.569648	6.45	.480852	38			
23	.541953	5.67	971917	.78	.570085	6.45	. 429965	37			
24	.542293	5.65	971870	.78	.570422	6.45	.429578	36			
25	.542632	5.65	.971828	.78	.570809	6.43	.429191	85			
26	.542971	5.65	.971776	.78	.571195	6 43	.428805	34			
27	.543310	5.65	.971729	.78	.571581	6.45	.428419	83			
28	.543649	5.68	.971682	:78	.571967	6.42	.428083	32			
29	.543987	5.63	.971685	.78	.572852	6.48	.427648	81			
30	.544325	5.63	.971588	.80	572738	6.42	.427262	30			
31	9.544663	1	9.971540	1	9.578128		10.426877	29			
32	.545000	5.62	.971498	.78	.578507	6.40	.426498	28			
33	.545338	5.63	.971446	.78	.578892	6.42	426108	27			
34	.545674	5.60	.971398	.80	.574276	6.40	425724	26			
35	.546011	5.62	.971851	.78	.574660	6.40	.425340	25			
36	.546347	5.60	.971808	.80	.575044	6.40	.424956	24			
37	.546683	5.60	.971256	.78	.575427	6.88	.424573	23			
38	.547019	5.60	.971208	.80	.575810	6 38	.424190	22			
39	.547354	5.58	.971161	.78	.576198	6.88	.423807	21			
40	.547689	5.58	.971113	80	.576576	6.38	.423424	20			
		5.58	11	.78		6.38		1			
41	9.548024	5.58	9.971066	.80	9.576959	6.87	10.423041	19			
42	.548359	5 57	.971018	.80	.577841	6.87	.422659 .422277	18			
43	.548693	5.57	.970970	.80	.577728	6.85		17			
44	.549027	5.55	.970922	.80	.578104	6.87	.421896	16			
45	.549360	5.55	.970874	.78	.578486	6.35	.421514	15			
46	.549693	5.55	.970827	.80	.578867	6.85	.421188	14			
47	.550026	5.55	.970779	.80	.579248	6.35	.420752	18			
48	.550359	5.55	.970731	80	579629	6.33	.420871	12			
49	.550692	5.53	.970683	. 80	580009	6.33	.419991	11			
50	.551024	5.58	970635	.82	.580389	6.33	.419611	10			
51	9.551356		9.970586	.80	9.580769	6.33	10.419231	9			
52	.551687	5.52	970538		. 581149		.418851	8			
53	.552018	5.52	970490	.80	581528	6.32	.418472	7			
54	.552349	5.52	.970442	.80	581907	6.32	.418098	6			
55	.552680	5.52	.970394	.80	.582286	6.82	.417714	5			
56	.553010	5.50	.970345	.82	.582665	$6.32 \\ 6.32$.417885	4			
57	.553341	5.52	.970297	.80 .80	.583044		.416956	8			
58	.553670	5.48	.970249		.583422	6.30	.416578	2			
59	.554000	5.50	.970200	.82	.583800	6.30	.416200	ĩ			
		5.48	9.970152	.80	9.584177	6.28	10.415823	ō			
60	9.554329										
60	9.554529	D. 1'.	3.510152	D. 1'.	0.001111	D. 1'.	10.110000				

111.

RT.								100
'	Sine.	D. 1'.	Cosine.	D. 1*.	Tang.	D. 1'.	Cotang.	,
0	9.554329 .554658	5.48	9.970152 .970103	.82	9.584177	6.30	. 10.415828 .415445	60 59
2	.554987	5.48	.970055	.80	.584932	6.28	.415068	58
8	.555315	5.47 5.47	.970006	.82 .82	.585309	6.28 6.28	.414691	57
4	.555643	5.47	.969957	.80	.585686	6.27	.414314	56
5	.555971 .556299	5.47	.969909	.82	.586062 .586439	6.28	.413938	55 54
6	.556626	5.45	.969860 .969811	.82	.586815	6.27	.418561 .418185	58
8	.556953	5.45	.969762	.82	.587190	6.25	.412810	52
9	.557280	5.45 5.48	.969714	.80 .82	.587566	6.27 6.25	.412484	51
10	.557606	5.43	.969665	.82	.587941	6.25	.412059	50
11	9.557932	5.43	9.969616	.82	9.588316	6.25	10.411684	49
12	.558258 .558583	5.42	.969567 .969518	.82	.588691	6.25	.411309 .410934	48 47
18 14	.558909	5.43	.969469	.82	.589440	6.23	.410560	46
15	.559234	5.42	.969420	.82	.589814	6.28	.410186	45
16	.559558	5.40 5.42	.969870	.83 .82	.590188	6.28 6.28	.409812	44
17	.559888	5.40	.969821	.82	.590562	6.22	.409438	48
18	.560207 .560531	5.40	.969272	.82	.590935	6.22	.409065 .408692	42 41
19 20	.560855	5.40	.969178	.83	.591681	6.22	.408319	40
21	9.561178	5.38	9.969124	.82	9.592054	6.22	10.407946	29
22	.561501	5.88	.969075	.82	.592426	6.20	.407574	38
28	.561824	5.38 5.37	.969025	.83 .82	.592799	6.22 6.20	.407201	87
24	.562146	5.87	.968976	.83	.593171	6.18	.406829	36
25	.562468	5.87	.968926	.82	.593542	6.20	.406458	35 34
26 27	.562790 .563112	5.87	.968877 .968827	.83	.598914 .594285	6.18	.406086 .405715	33
28	.563433	5.35	.968777	.88	.594656	6.18	.405844	82
29	.563755	5.87 5.88	.968728	.82	.595027	6.18 6.18	.404973	81
30	-564075	5.85	.968678	.83	.595398	6.17	.404602	30
81	9.564396	5.88	9.968628	.88	9.595768	6.17	10.404282	29
82	.564716	5.88	.968578	.83	.596138	6.17	.403862	28
88	.565036 .565356	5.33	.968528 .968479	.82	.596508 .596878	6.17	.408492 .408122	27 26
85	.565676	5.88	.968429	.83	.567247	6.15	.402758	25
86	.565995	5.82 5.82	.968379	.83 .83	.597616	6.15 6.15	.402384	24
87	.566314	5.30	.968329	.85	.597985	6.15	.402015	23 22
38	.566632 .566951	5.32	.968278 .968228	.83	.598354	6.18	.401646	22
40	.567269	5.30	.968178	.83	.598723 .599091	6.15	.401278 .400909	20
1		5.80		.83		6.18		19
41	9.567587 .567904	5.28	9.968128 .968078	.83	9.599459 .599827	6.18	10.400541	18
48	.568222	5.80	.968027	.85	.600194	6.12	399806	17
44	.568539	5.28 5.28	.967977	.83	.600562	6.18 6.12	.399438	16
45	.568856	5.27	.967927	.85	.600929	6.12	.399071	15 14
46	.569172 .569488	5.27	.967876 .967826	.83	.601296 .601663	6.12	.898704 .898837	13
48	.569804	5.27	.967775	.85	602029	6.10	.397971	12
49	.570120	5.27 5.25	.967725	.83 .85	.602395	6.10 6.10	.397605	11
50	.570435	5.27	.967674	.83	.602761	6.10	.897239	10
51	9.570751	5.25	9.967624	.85	9.608127	6.10	10.396873	9
52	.571066	5.23	.967578	.85	.603493	6.08	.396507	8
58 54	.571380 .571695	5.25	.967522 .967471	.85	.603858 .604223	6.08	.396142 .395777	6
55	.572009	5.28	.967421	.83	.604588	6.08	.395412	5
56	.572323	5.23 5.22	.967870	.85 .85	.604953	6.08	.395047	4 8
57	.572636	5.23	.967819	.85	.605317	6.08	.394688	8
58 59	.572950	5.22	.967268	.85	.605682	6.07	.394318	2
60	.573268 9.573575	5.20	.967217 9.967166	.85	.606046 9.606410	6.07	.398954 10.393590	0
1-								<u> </u>
'	Cosine.	D. 1'.	Sine.	D. 1'.	Cotang.	D. 1".	Tang.	'

22*		• • • • • • • • • • • • • • • • • • • •						1574
,	Sine.	D. 1*.	Cosine.	D. 1*.	Tang.	D. 1".	Cotang.	
0	9.578575		9.967166	~~	9.606410	6.05	10.393590	60
1	.573888	5.22 5.20	.967115	.85 .85	.606778	6.07	. 393227	59
2	.574200	5.20	.967064	.85	.607137	6.05	.392863	58
8	.574512	5.20	967013	.87	.607500	6.05	.892500	57
4	.574824	5.20	.966961	.85	.607868	6.08	.892137	56
5	.575136	5.18	.966910	.85	.608225	6.05	.891775	55
6	.575447	5.18	.966859	.85	.608588	6.03	.891412	54 53
8	.575758 .576069	5.18	.966808 .966756	.87	.608950 .609312	6.03	.391050 .390688	52
9	.576879	5.17	.966705	.85	.609674	6.03	.390326	51
1 10	.576689	5.17	.966653	.87	.610036	6.08	.389964	50
1		5.17	11	.85		6.02		
11	9.576999	5.17	9.966602	.87	9.610897	6.03	10.389603	49 48
12	.577309 .577618	5.15	.966550 .966499	.85	.610759 .611120	6.02	.389241 .888880	47
14	577927	5.15	.966447	.87	.611480	6.00	.388520	46
15	.578236	5 15	.966395	.87	.611841	6.02	.388159	45
16	.578545	5.15	.966344	-85	612201	6.00	.387799	44
17	.578853	5.13	.966292	.87	612561	6.00	.387439	48
18	.579162	5.15 5.13	.966240	.87	.612921	6.00	.387079	42
19	.579470	5.13	.966188	.87	.613281	6.00	.386719	41
20	.579777	5.13	.966136	.85	.613641	5.98	. 386359	40
21	9.580085		9.966085	1	9.614000	ı	10.886000	39
22	.580892	5.12	.966033	.87	.614359	5.98	385641	38
23	.580699	5.12	.965981	.87	.614718	5.98 5.98	.385282	37
24	.581005	5.10 5.12	.965929	.87 .88	.615077	5.97	. 384923	36
25	.581312	5.10	.965876	.87	.615435	5.97	.384565	35
26	.581618	5.10	.965824	87	.615793	5.97	. 384207	34
27	.581924	5.08	.965772	.87	.616151	5.97	.383849	38
28	.582229	5.10	.965720	.87	.616509	5.97	.383491	32
29 30	.582535	5.08	.965668 .965615	.88	616867	5.95	.383138 .382776	31 30
		5.08		.87		5 97		
81	9.583145	5.07	9 965568	.87	9.617582	5.95	10 382418	20
82	.583449	5.08	965511	.88	617939	5.98	.382061	28
33	583754	5.07	965458 965406	.87	.618295 .618652	5.95	.381705 .381348	27 26
34 35	.584058 .584361	5.05	965353	.88	619008	5.93	380992	25
36	.584665	5.07	965301	.87	.619364	5.98	.380636	24
37	.584968	5.05	965248	.88	.619720	5.93	.380280	28
38	.585272	5.07	.965195	88	.620076	5.93	379924	22
39	.585574	5.03 5.05	.965143	.87 .88	.620432	5 98 5.92	.879568	21
40	.585877	5.03	.965090	.88	.620787	5.92	.879218	20
41	9.586179		9.965037		9.621142		10.378858	19
42	.586482	5.05	.964984	.88	.621497	5.92	.378503	18
43	586783	5.02 5.03	.964931	.88 .87	.621852	5.92 5.92	.378148	17
44	.587085	5.02	.964879	.88	.622207	5.90	.877798	16
45	.587386	5.03	.964826	.88	.622561	5.90	.877489	15
46	.587688	5.02	964778	.88	.622915	5.90	.877085	14
47	.587989	5.00	.964720	.90	.623269	5.90	.876781	18
49	.588289	5.02	964666	.88	.623976	5.88	.876877	12
50	.588890	5.00	964613 .964560	.88	.624330	5.90	.376024 .375670	11 10
1		5.00	11	.88	1	5.88		
51	9.589190	4.98	9.964507	.88	9.624683	5.88	10.875817	9
52 53	.589489 .589789	5.00	.964454	.90	.625086 .625388	5.87	.374964	8
54	.589789	4.98	.964400	.90 .88	.625741	5.88	.374612 .374259	6
55	.590387	4.98	.964294	.88	.626093	5.87	.378907	5
56	.590686	4.98	.964240	.90	.626445	5.87	.878555	4
57	.590984	4.97	.964187	.88	626797	5.87	.873203	8
58	591282	4.97	.964188	.90 .88	.627149	5.87 5.87	.872851	2
59	.591580	4.97	964080	.90	.627501	5.85	872499	1
60	9.591878	2.01	9.964026		9.627852		10.872148	0
1	Cosine.	D. 1'.	Sine.	D. 1".	Cotang.	D. 1'.	Tang.	'-

23"								196-
[,]	Sine.	D. 1'.	Cosine.	D. 1*.	Tang.	D. 1'.	Cotang.	•
0	9.591878	4.97	9.964026	.90	9.627852	5.85	10.872148	60
1	.592176	4.95	.963972	.88	.628203	5.85	.871797	59
2 8	.592478 .592770	4.95	.963919 .963865	.90	.628554 .628905	5.85	.371446 .371095	58 57
1 4	.593067	4.95	.963811	.90	.629255	5.83	.370745	56
5	.598363	4.98	.963757	.90	629606	5.85	370894	55
6	.593659	4.93 4.93	.963704	.88 .90	.629956	5.83 5.83	.370044	54
7	.598955	4.93	.963650	.90	.630306	5.83	.369694	53
8	.594251	4.93	.963596	.90	.630656	5.82	.369344	52
.9	.594547	4.92	.963542	.9ŏ	.631005 .631355	5.83	.368995 .368645	51
10	.594842	4.92	.963488	.90		5.82	*******	50
11	9.595137	4.92	9.963434	.92	9.631704	5.82	10.368296	49
12	.595432	4.92	.963379	.90	.632053	5.82	.367947	48
18 14	.595727 .596021	4.90	.963325 .963271	.90	.632402 .632750	5.80	.367598 .367250	47 46
15	.596815	4.90	.963217	.90	.633099	5.82	.366901	45
16	.596609	4.90	.963163	.90	.633447	5.80	.366553	44
17	.596908	4.90 4.88	.963108	.92 .90	.633795	5.80 5.80	.366205	43
18	.597196	4.90	.963054	.92	.634143	5.78	.365857	42
19	.597490	4.88	.962999	.90	.634490	5.80	.365510	41
20	.597783	4.87	.962945	.92	.634838	5.78	.365162	40
21	9.598075	4.88	9.962890	.90	9.635185	5.78	10.364815	39
22	.598368	4.87	.962836	92	.635532	5.78	.364468	88
23	.598660	4.87	.962781	.90	.635879 .636226	5.78	.364121	37 36
24 25	.598952 .599244	4.87	.962727	.92	.636572	5.77	.363774 .363428	35
26	.599536	4.87	.962617	.92	.636919	5.78	.363081	84
27	.599827	4.85	.962562	.92	.637265	5.77	.862735	33
28	.600118	4.85 4.85	.962508	.90	.637611	5.77 5.75	.362389	82
29	.600409	4.85	.962453	92	.637956	5.77	.362044	81
30	.600700	4.83	.962398	.92	.638302	5.75	.361698	80
81	9.600990	4.83	9.962343	.92	9.638647	5.75	10.361353	29
82	.601280	4.83	.962288	92	.638992	5.75	.361008	28
83	.601570	4.83	.962233	.92	.639337 .639682	5.75	.360663 .360318	27 26
84	.601860 .602150	4.83	.962178	.92	.640027	5.75	.359973	25
36	.602439	4.82	962067	.93	.640371	5.78	359629	24
87	.602728	4.82	.962012	.92	.640716	5.75	.359284	23
38	.603017	4.82 4.80	.961957	.92	.641060	5.73 5.78	.358940	22
89	.603305	4.82	.961902	.93	.641404	5.72	.358596	21
40	.603594	4.80	.961846	.92	.641747	5.78	.358253	20
41	9.603882	4.80	9.961791	.93	9.642091	5.72	10.857909	19
42	.604170	4.78	.961735	.92	.642434	5.72	.357566	18
43	.604457 .604745	4.80	.961680 .961624	.98	.642777 .643120	5.72	.857223 .856880	17 16
45	.605032	4.78	.961569	.92	.643462	5.72	.356537	15
46	.605819	4.78	.961513	.98	.643806	5.72	.356194	14
47	.605606	4.78	.961458	.92	.644148	5.70 5.70	.355852	13
48	.605892	4.78	.961402	.98	.644490	5.70	.355510	12
49	.606179	4.77	.961846	.98	.644832	5.70	.355168	11
50	.606465	4.77	.961290	.92	.645174	5.70	.354826	10
51	9.606751	4.75	9.961235	99	9.645516	5.68	10.354484	9
52	.607036	4.77	.961179	.98	.645857	5.70	.854143	8
58 54	607322	4.75	.961123 .961067	.93	.646199	5.68	.353801 .353460	6
55	.607892	4.75	.961007	.98	.646881	5.68	.353119	5
56	.608177	4.75	.960955	.98	.647222	5.68	.352778	4
57	.608461	4.73	.960899	.98	.647562	5.67 5.68	.352438	8
58 59	.608745	4.73	.960843	.95	.647903	5.67	.352097	2
60	.609029 9.609313	4.78	9.960786	.93	. 648243 9 . 648583	5.67	.851757	ĭ
1 00	8.000013		a.800180		J.045083		10.351417	0
1	Cosine.	D. 1".	Sine.	D. 1'.	Cotang.	D. 1".	Tang.	1
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0 1 2 8 4 5 6	9.609813 .609597 .609880 .610164 .610729 .611012	D. 1°. 4.73 4.72 4.73 4.72 4.73 4.72 4.70	9.960730 .960674 .960618	D. 1*.	Tang.	D. 1°.	Cotang.	,
1 2 8 4 5	.609597 .609880 .610164 .610447 .610729 .611012	4.72 4.73 4.72	.960674 .960618	.98	9.648583			_
2 8 4 5 6	.609880 .610164 .610447 .610729 .611012	4.72 4.73 4.72	.960618	.80		5.67	10.851417	60
8 4 5 6	.610164 .610447 .610729 .611012	4.73 4.72			.648923	5.67	.851077	59
4 5 6	.610447 .610729 .611012	4.72		.95	.649263	5.65	.850787	58
5	.610729 .611012		.960561	.93	.649602	5.67	.850898 .850058	57 56
6	.611012		.960505	.95	.649942 .650281	5.65	.849719	55
		4.72	.960392	.93	.650620	5.65	.349380	54
7		4.70	.960335	.95	.650959	5.65	.349041	58
8	.611576	4.70 4.70	.960279	.93 .95	.651297	5.68 5.65	.848708	52
9	.611858	4.70	.960222	.95	.651636	5.68	.848864	51
10	.612140	4.68	.960165	.93	.651974	5.68	.848026	50
11	9.612421	4.68	9.960109	.95	9.652312	5.68	10.847688	49
12	.612702	4.68	.960052	.95	.652650	5.68	.847850	48
13	.612983	4.68	.959995	.95	.652988	5.68	.847012	47
14 15	.613264 .613545	4.68	.959938	.93	.658826 .658663	5.62	346874 346887	46
16	.613825	4.67	.959825	.95	.654000	5.62	.846000	44
17	.614105	4.67	.959768	.95	.654337	5.62	.845668	43
18	.614385	4.67	.959711	.95 .95	.654674	5.62 5.62	.845826	42
19	.614665	4.65	.959654	.97	.655011	5.62	.844989	41
20	.614944	4.65	.959596	.95	.655348	5.60	.844652	40
21	9.615223		9.959539	.95	9.655684		10.844816	89
22	.615502	4.65 4.65	.959482	.95	.656020	5.60 5.60	.343980	88
23	.615781	4.65	.959425	.95	.656856	5.60	.848644	87
24	.616060	4.63	.959368	.97	.656692	5.60	.848808	86 85
25 26	.616338 .616616	4.63	.959810 .959258	.95	.657028	5.60	.842972 .842686	84
97	.616894	4.63.	.959195	.97	.657699	5.58	.342301	83
27 28	.617172	4.63	.959188	.95	.658084	5.58	.841966	82
29	.617450	4.63 4.62	.959080	.97	.658369	5.58 5.58	.341631	81
80	.617727	4.62	.959028	.97	.658704	5.58	.841296	30
81	9.618004		9.958965	1	9.659089	1	10.840961	29
82	.618£81	4.62	.958908	.95	.659373	5.57 5.58	.340627	28
33	.618558	4.60	.958850	.97	.659708	5.57	.840292	27
84	.618834	4.60	.958792	.97	.660042	5.57	.889958	26
35	.619110	4.60	.958734	.95	.660376 .660710	5.57	.339624	25 24
86 87	.619386 .619662	4.60	.958619	.97	.661043	5.55	.338957	28
88	.619938	4.60	.958561	.97	.661877	5.57	338628	22
39	.620213	4.58	.958503	.97	.661710	5.55 5.55	.338290	21
40	.620488	4.58 4.58	.958445	.97	.662043	5.55	.887957	20
41	9.620763		9.958387	I .	9.662376		10.887624	19
42	.621038	4.58	.958329	.97	.662709	5.55	.887291	18
43	.621313	4.58 4.57	.958271	.97	.668042	5.55 5.55	.886958	17
44	.621587	4.57	.958218	.98	.663375	5.58	.896625	16
45	.621861	4.57	.958154	.97	.668707	5.58	.886298	15
46	.622135	4.57	.958096 .958038	.97	.664089	5.58	.835961 .835629	14 18
47 48	.622682	4.55	.957979	.98	.664708	5.58	.835297	12
49	.622956	4.57	.957921	.97	.665035	5.58	.884965	iĩ
50	623229	4.55	.957863	.97	.665366	5.52	.884684	10
51	9,623502	4.55	9.957804	.98	9.665698	5.58	10.334302	9
52	.623774	4.53	.957746	.97	.666029	5.52	.333971	8
53	.624047	4.55	.957687	.98	.666360	5.52	.333640	7
54	.624319	4.58 4.58	.957628	.98 .97	.666691	5.58 5.50	. 333309	6
55	.624591	4.53	.957570	.98	.667021	5.52	.332979	5
56	.624863	4.53	.957 11	.98	.667852	5.50	.332648	8
57 58	.625135	4.52	.957452 .957393	.98	.667682	5.52	.332318	8
59	625677	4.52	.957335	.97	.668343	5.50	.331657	î
60	9.625948	4.52	9.957276	.98	9.668678	5.50	10.881827	ō
_	-	D ==	-		!	I		
_ ′	Cosine.	D. 1°.	Sine.	D. 1'.	Cotang.	D. 1°.	Tang.	1'

Sine D. 1" Cosine D. 1" Tang D. 1" Cotang /	29°								104
1	,	Sine.	D. 1*.	Cosine.	D. 1*.	Tang.	D. 1*.	Cotang.	,
2 (68940) 4 .50	0		4 80		no		E 49		
3								.830998	59
4 . 627090 4.50 . 967040 . 98 66991 5.48 . 38060 55 6 . 627370 4.50 . 966921 1.00 . 670649 5.48 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 54 8 . 383681 55 . 48 8 . 383685 51 1 0 . 671963 5.47 3. 383683 55 . 48 8 . 383685 51 1 0 . 671963 5.47 3. 382683 56 1 1 0 . 673681 55 . 48 8 . 383685 51 1 0 . 3827881 44 8 . 966566 . 98 9.672891 5.47 3. 387081 47 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	×		4.50		.98		5.48	.000008	57
5					.98				56
6 6 .627790 4 .05 .966921 .98 .670977 5 .47 .329023 18 .628109 4 .48 .966964 .98 .671936 5 .48 .328945 10 .628247 4 .48 .966964 .98 .671936 5 .48 .328945 12 .9829185 4 .48 .966964 .98 .671936 5 .48 .328937 50 .911 9 .628248 4 .47 .966366 .98 .9672391 5 .47 .328037 50 .911 9 .628248 4 .47 .966364 .98 .673247 5 .47 .328037 60 .982473 1 .47 .966447 .98 .96724 5 .47 .328037 6 .98 .47 .966364 .98 .673247 5 .47 .328037 6 .98 .47 .96636 1 .00 .673247 5 .47 .328037 4 .47 .966367 1 .00 .673247 5 .47 .328038 4 .47 .966368 1 .00 .673247 5 .47 .328038 4 .47 .966368 1 .00 .673247 5 .47 .328738 4 .47 .96638 1 .00 .673247 5 .47 .328738 4 .47 .96638 1 .00 .673247 5 .47 .328738 4 .47 .96638 1 .00 .673247 5 .47 .328738 4 .47 .96638 1 .00 .673247 5 .47 .328738 4 .48 .98638 1 .00 .673247 5 .47 .328738 4 .48 .98638 1 .00 .673247 5 .47 .328738 4 .48 .98638 1 .00 .673247 5 .47 .328738 4 .48 .98638 1 .00 .673247 5 .47 .328738 4 .48 .98638 1 .00 .673247 5 .43 .325488 4 .48 .985390 1 .00 .673247 5 .43 .325488 4 .48 .985390 1 .00 .673247 5 .43 .323488 3 .98 .67324 4 .44 .985390 1 .00 .673247 5 .43 .323488 3 .98 .67324 4 .44 .985390 1 .00 .673247 5 .43 .323488 3 .98 .67324 4 .44 .985390 1 .00 .673247 5 .43 .323488 3 .98 .98 .67324 4 .44 .985390 1 .00 .673247 5 .43 .323488 3 .98 .98 .98 .98 .98 .98 .98 .98 .98 .98	5			.956981	.98	.670820			
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88 .689097 4.85 .985005 1.02 .681092 5.40 .818906 22 40 .686083 4.38 .984944 1.02 .681092 5.40 .818986 22 40 .686823 4.38 .984888 1.00 .681740 5.40 .318260 20 41 9.686826 4.37 9.94823 1.00 .682740 5.88 .318260 20 42 637411 4.37 .984701 1.02 .682971 5.38 .317313 18 43 .637411 4.37 .984701 1.02 .683953 5.38 .317613 18 44 .637985 4.37 .984579 1.02 .683956 5.38 .316997 17 45 .637985 4.37 .984579 1.02 .683956 5.38 .316391 14 47 .63468 4.37 .984579 1.02 .683970 5.37 .315891 14 <th< td=""><td></td><td></td><td></td><td></td><td></td><td>.680444</td><td></td><td>.819000</td><td></td></th<>						.680444		.819000	
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41 9.636896 4.37 9.64823 1.00 9.68236 5.40 10.31797 19 42 637148 4.38 96.4762 1.02 9.68237 5.38 317937 19 43 637411 4.37 9.64640 1.02 683913 5.38 317290 17 44 6.37673 4.37 9.64640 1.02 683935 5.38 316967 16 45 637965 4.37 9.64610 1.02 683965 5.38 316967 16 46 638197 4.37 9.64618 1.02 683856 5.38 316844 11 47 638468 4.35 9.64518 1.02 683867 5.38 316844 11 47 638468 4.35 9.64518 1.02 683867 5.38 316821 14 48 638730 4.37 9.6496 1.02 684001 5.37 316821 14 49 638961 4.35 9.64365 1.03 684646 5.37 315899 13 50 638242 4.35 9.64365 1.03 684646 5.37 315808 12 51 9.63803 4.35 9.64374 1.03 684646 5.37 315032 10 51 9.63803 4.35 9.64513 1.03 684646 5.37 316032 10 52 639764 4.33 9.64513 1.03 684646 5.37 316032 10 53 639764 4.33 9.64163 1.03 686612 5.37 314388 8 53 640024 4.33 9.64609 1.03 686612 5.37 314388 8 53 64024 4.33 9.64629 1.03 686612 5.37 3134388 8 53 64024 4.33 9.64629 1.03 686612 5.37 3134388 8 54 64024 4.33 9.64629 1.03 686612 5.37 3134066 7 54 64024 4.33 9.64629 1.03 686612 5.37 313406 7 55 640644 4.33 9.63608 1.02 686876 5.35 313406 7 55 640644 4.33 9.63608 1.02 686876 5.35 313406 7 56 64064 4.33 9.83806 1.02 686876 5.35 313408 7 57 641064 4.33 9.83806 1.03 68761 5.35 313408 7 58 641683 4.33 9.83806 1.03 68761 5.35 313408 7 58 641683 4.33 9.83806 1.03 68761 5.35 313408 7 58 641683 4.33 9.83806 1.03 68761 5.35 313408 7 59 641683 4.33 9.83806 1.03 687761 5.35 313408 7 59 641683 4.33 9.83806 1.03 687761 5.35 313408 9 59 641883 4.33 9.83806 1.03 687761 5.35 313408 9 59 641883 4.33 9.83806 1.03 687761 5.35 313408 9 59 641883 4.33 9.83806 1.03 687761 5.35 313408 9 59 641883 4.33 9.83806 1.03 687761 5.35 313408 9 59 641883 4.33 9.83806 1.03 687761 5.35 313408 9 59 641883 4.33 9.83806 1.03 687761 5.35 313408 9 59 641883 4.33 9.83806 1.03 687761 5.35 313408 9 59 641883 4.33 9.83806 1.03 687761 5.35 313408 9 59 641883 4.33 9.83806 1.03 687761 5.35 313408 9 59 641883 4.33 9.83806 1.03 687761 5.35 313408 9 50 641883 4.33 9.83806 1.03 687761 5.35 313408 9 50 641883 4.33 9.83806 1.03 687761 5.35 313408 9 50 641883 4.33 9.8380								.818584	21
43 637411 4.36 954701 1.02 682387 5.48 317513 134 44 637673 4.37 9546701 1.02 682710 5.38 317390 17 44 637673 4.37 9546701 1.02 682710 5.38 317390 17 45 687065 4.37 954670 1.02 682938 5.38 317390 17 45 683067 4.37 954670 1.02 683956 5.38 316967 16 45 683197 4.37 9545710 1.02 683956 5.38 316967 16 45 683197 4.37 9545710 1.02 683956 5.38 316941 14 47 633469 4.35 954457 1.02 684961 5.37 316321 14 47 633469 4.37 954457 1.02 684924 5.38 315676 12 49 63961 4.35 954355 1.02 684524 5.37 316321 14 15 63961 4.35 954355 1.02 684524 5.37 315354 11 10 10 10 10 10 10 10 10 10 10 10 10	1			1.00.000				1	1
43 637411 4.83 984701 1.02 689710 5.88 317329 17 44 637673 4.87 954640 1.02 68903 5.88 316967 16 45 637985 4.87 954679 1.02 68903 5.88 316967 16 46 688197 4.87 954579 1.02 688956 5.88 316967 16 47 688468 4.87 954579 1.02 688967 5.87 316987 12 48 638720 4.85 954587 1.02 68424 5.87 31599 13 48 638720 4.85 954896 1.03 68424 5.87 31599 13 49 639061 4.85 954896 1.03 68466 5.87 315032 10 50 639242 4.85 954886 1.03 68466 5.87 315032 10 51 9.69863 4.85 954152 1.02 68466 5.87 315032 10 51 9.69863 4.85 954152 1.02 68468 5.87 315032 10 53 640024 4.83 954152 1.02 9.68590 5.87 315032 10 53 640024 4.83 954152 1.02 9.68590 5.87 316032 10 54 640284 4.83 954020 1.03 685612 5.87 314388 8 55 640024 4.33 954000 1.03 685934 5.87 31608 8 55 64004 4.83 954000 1.03 685934 5.87 31608 8 55 640644 4.83 958068 1.02 686896 5.87 313428 5 56 64004 4.83 958068 1.03 68957 5.87 313425 6 56 64004 4.83 958068 1.03 686896 5.87 313425 5 56 64004 4.83 958068 1.03 68957 5.87 313425 5 56 64064 4.83 958068 1.03 68957 5.85 313425 5 56 64064 4.83 958068 1.03 687540 5.85 313429 5 57 641064 4.83 958365 1.02 687640 5.85 312189 1 59 641683 4.83 958783 1.02 687840 5.85 312189 1 59 641683 4.83 958783 1.02 687840 5.85 312189 1 59 641683 4.83 958783 1.02 687840 5.85 312189 1			4.87		1 02	9.682063	5.40		
44 687678 4.87 954640 1.02 688958 5.88 316967 14 6 688197 4.87 954579 1.02 683956 5.88 316967 14 6 688197 4.87 954579 1.02 683856 5.88 316967 14 7 683468 4.87 95458 1.02 683856 5.88 316967 14 7 683468 4.87 954457 1.02 683679 5.87 3156321 14 7 683468 4.87 954496 1.02 684924 5.87 315697 12 7 9 683679 4.85 954858 1.02 684924 5.87 315676 12 7 9 683678 4.85 954858 1.02 684968 5.87 315632 11 7 9 9 683678 4.85 954858 1.02 968590 5.87 315471 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	49		4.88		1.02	689710	5.38		
46			4.87		1.02	688093		.816967	16
46	45	.687985		.954579		683356	5 92	.816644	15
48 689720 4.35 5.4896 1.03 684524 5.37 315676 12 49 63961 4.35 5.4896 1.03 684464 5.37 315676 12 50 639243 4.35 5.48274 1.03 684646 5.37 315632 10 51 9.639603 4.35 9.54153 1.02 9.68698 5.37 10.314710 9 53 639764 4.33 9.54153 1.02 9.68692 5.37 314386 5 53 640024 4.33 9.54090 1.03 685612 5.37 314686 7 54 64024 4.33 9.54090 1.03 685934 5.37 314686 7 55 640644 4.33 9.54090 1.02 686612 5.37 314386 5 55 640644 4.33 9.53068 1.03 68698 5.37 313426 5 56 640604 4.33 9.53068 1.03 68698 5.37 313428 5 56 641064 4.33 9.53685 1.02 68698 5.37 313428 5 57 641064 4.33 9.53686 1.03 687540 5.35 313102 4 57 641064 4.33 9.53686 1.03 687540 5.35 313102 4 58 641384 4.33 9.58773 1.03 687540 5.35 312489 1 59 641563 4.33 9.58773 1.02 687540 5.35 312489 1 59 641563 4.33 9.58773 1.02 687640 5.35 312489 1 59 641563 4.33 9.58773 1.03 687540 5.35 312189 1 59 641563 4.33 9.58773 1.02 687861 5.35 312189 1		.638197					5.87		
49 . 689961 4.85 . 954835 1 03 . 684646 5 .87 . 515854 11 . 50 . 639242 4.85 . 954874 1 .03 . 684968 5 .87 . 315032 1 1 . 51 . 51 . 51 . 51 . 51 . 51 . 51			4.87	.954457	1 02		5.88		
50 .689242 4.85 .954274 1.02 .684968 5.87 .315032 10 51 9.689803 4.85 9.984213 1.02 9.88590 5.87 10 314710 9.8590 5.87 314898 8 53 640024 4.33 .98490 1.03 .685612 5.87 314898 8 54 .64024 4.33 .984029 1.02 .68692 5.87 314898 8 55 .640244 4.33 .985908 1.02 .686877 5.87 31828 5 56 .64084 4.33 .985908 1.02 .686877 5.35 313102 4 57 .641064 4.33 .983906 1.02 .686898 5.35 313102 4 58 .641384 4.33 .983729 1.02 .68740 5.85 .312781 3 59 .641834 4.33 .983968 1.03 .687540 5.85 .312460			4.85				5.87		
59 .689764 4.85 .964169 1.09 .685612 5.87 .814898 8 53 .640024 4.33 .954090 1.03 .686824 5.37 .814898 8 54 .640284 4.33 .954029 1.02 .696256 5.37 .813745 6 55 .640644 4.33 .953968 1.02 .696876 5.35 .813745 6 56 .640644 4.33 .958765 1.02 .68698 5.35 .813102 4 57 .641064 4.33 .958783 1.02 .687219 5.36 .812781 3 58 .641284 4.33 .958783 1.02 .687240 5.35 3.312460 2 59 .641263 4.33 .958783 1.03 .687661 5.85 .312189 1 60 9.641843 4.33 .958763 1.03 .687661 5.85 .312189 1	50							.315032	10
58 .640024 4.83 .964090 1.03 .086012 5.87 .314366 7 54 .64024 4.33 .964090 1.02 .686894 5.85 814066 7 55 .640244 4.33 .965068 1.02 .686877 5.87 .818423 5 56 .640604 4.33 .963906 1.02 .686896 5.35 .318102 4 57 .641064 4.33 .953906 1.02 .687219 5.85 .812761 3 58 .641384 4.33 .953783 1.03 .687540 5.85 .812460 2 59 .641863 4.32 .953783 1.02 .687861 5.85 .312189 1 60 9.641843 4.32 .983600 1.08 .687861 5.85 .312189 1									
54 .640294 4.33 .954029 1.02 680255 5.87 318745 6 55 .640544 4.83 .953968 1.02 .696877 5.87 313428 5 56 .640644 4.83 .953906 1.02 .696896 5.85 313420 4 57 .641064 4.83 .953945 1.02 .687219 5.85 .812761 8 58 .641384 4.83 .953729 1.02 .687861 5.85 .812460 2 59 .641563 4.32 .953729 1.03 .687861 5.85 .312189 1 9 .641849 9.853680 1.08 9.688183 10.311818 0			4.83		1.03		5.37	81408A	7
55 .640644 4.83 .965968 1.02 .686877 5.37 .813423 5 56 .640604 4.83 .963906 1.02 .686898 5.85 .313102 4 57 .641064 4.83 .958783 1.02 .687219 5.85 .812781 8 58 .641824 4.83 .958783 1.02 .687240 5.85 .312460 2 60 9.641843 4.83 9.953660 1.08 9.688183 5.35 10.311818 0	54			.954029					6
58 .641384 4.83 .963783 1.02 .687780 5.85 .312460 2 60 9.641843 4.83 9.953660 1.08 9.688183 5.85 .312189 1 1 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660	55		4.88						5
58 .641384 4.83 .963783 1.02 .687780 5.85 .312460 2 60 9.641843 4.83 9.953660 1.08 9.688183 5.85 .312189 1 1 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660 0.963660	56		4.83		1.02				4
59 .641863 4.33 9.853680 1.08 9.887861 5.85 312189 1 9.853680 9.641843 6.85 10.311818 0	57 KO		4.83		1.03		5 85	1812181	
60 9.641849 4.83 9.983660 1.08 9.688183 5.80 10.811818 0	50							.312189	Ĩ
Cosine. D. 1'. Sine. D. 1'. Cotang. D. 1'. Tang.	60		4.82		1.08		5.85		Ö
	7	Cosine.	D. 1'.	Sine.	D. 1'.	Cotang.	D. 1'.	Tang.	1

26°								158•
,	Sine.	D. 1.	Cosine.	D. 1*.	Tang.	D. 1.	Cotang.	,
0	9.641842	4.82	9.953660	1.02	9.688182	5.83	10.811818	60
1	.642101	4.82	.953599	1.03	.688502	5.32	.311498	59
8	.642360	4.80	.953537 .953475	1.08	.688823	5.33	.311177	58
4	.642618	4.82	.958418	1.08	.689143	5.88	.810857 .810587	57
5	.643135	4.80	.953352	1.02	.689788	5.88	.810217	56 55
6	. 648398	4.80 4.28	.958290	1.08	.690108	5.88 5.88	.309897	54
7	.643650	4.80	.958228	1.08	.690428	5.82	.809577	53
8	.643908 .644165	4.28	.953166	1.08	.690742 .691062	5.83	.309258 .308938	52
10	.644428	4.30	.958042	1.08	.691381	5.32	.308619	51 50
11	9.644680	4.28	9.952980	1.08	9.691700	5.82	10.308300	
12	.644986	4.27	.952918	1.08	.692019	5.82	.307981	49 48
13	.645198	4.28	.952855	1.05 1.08	.692338	5.82 5.80	.307062	47
14	.645450	4.28 4.27	.952798	1.08	.692656	5.80 5.82	.307344	46
15	.645706	4.27	.952781	1.08	.692975	5.30	.307025	45
16	.645962 .646218	4.27	.952669	1.05	.693293 .693612	5.32	.306707	44
17	.646474	4.27	.952544	1.03	.693930	5.30	.306388	43 42
19	.646729	4.25	.952481	1.05	.694248	5.80	.305752	41
20	.646984	4.25	.952419	1.08	.694566	5.80 5.28	.305434	40
21	9.647240	1	9.952856		9.694883	1	10.305117	39
22	.647494	4.23 4.25	.952294	1.08 1.05	.695201	5.80 5.28	.304799	38
23	.647749	4.25	.952281	1.05	.695518	5.30	.304482	37
24	.648004	4.23	.952168	1.08	.695836	5.28	.304164	36
25 26	.648258 .648512	4.23	.952106 .952048	1.05	.696158 .696470	5.28	.303847	35
27	.648766	4.23	.951980	1.05	.696787	5.28	.303213	34 33
28	.649020	4.23 4.23	.951917	1.05 1.05	.697103	5.27	.302897	32
29	.649274	4.23	.951854	1.05	.697420	5.28 5.27	.302580	81
30	.649527	4.23	.951791	1.05	.697736	5.28	.302264	30
31	9.649781	4.22	9.951728	1.05	9.698053	5.27	10.801947	29
32	.650084	4.22	.951665	1.05	.698369	5.27	.801681	28
33 34	.650287	4.20	.951602 .951589	1.05	.698685 .699001	5.27	.301315 .300999	27
35	.650792	4.22	.951476	1.05	.699316	5.25	.300684	26 25
36	.651044	4.20	.951412	1.07 1.05	.699632	5.27	.300368	24
37	.651297	4.22 4.20	.951349	1.05	.699947	5.25 5.27	.300053	23
38	.651549	4.18	.951286	1 07	.700268	5.25	.299737	22
39 40	.651800 .652052	4.20	.951222 .951159	1.05	.700578 .700898	5.25	.299422 .299107	21
		4.20		1.05	1	5.25	1	20
41 42	9.652304 .652555	4.18	9.951096 .951082	1.07	9.701208 .701528	5.25	10.298792	19
43	.652806	4.18	.950968	1.07	.701887	5.28	.298477 .298163	18 17
44	.653057	4.18 4.18	.950905	1.05 1.07	.702152	5.25	.297848	16
45	653308	4.17	.950841	1.05	.702466	5.28 5.25	.297584	15
46	.653558	4.17	.950778	1.07	.702781	5.28	.297219	14
47 48	.653808 .654059	4.18	.950714 .950650	1.07	.703095 .703409	5.28	.296905 .296591	13
48	.654309	4.17	.950586	1.07	.703409	5.22	.296278	12 11
50	.654558	4.15	.950522	1.07 1.07	.704036	5.23 5.23	.295964	10
51	9.654808	4.17	9.950458		9.704350		10.295650	9
52	.655058	4.17	.950394	1.07	.704663	5.22	.295337	8
53	. 655307	4.15 4.15	. 950330	1.07	.704976	5.22 5.23	.295024	7
54	.655556	4.15	.950266	1.07	.705290	5.22	.294710	6
55	.655805	4.15	.950202 .950188	1.07	.705603 .705916	5.22	.294397	5 4
56 57	656054 656302	4.13	.950074	1.07	.706228	5.20	.294084 .293772	8
58	. 656551	4.15	.950010	1.07	.706541	5.22 5.22	.293459	2
59	.656799	4.18 4.18	. 949945	1.08 1.07	.706854	5.20	.293146	1
60	9.657047	7.10	9.949881	1.00	9.707166		10.292834	0
7	Cosine.	D. 1'.	Sine.	D. 1'.	Cotang.	D. 1'.	Tang.	,
					B			

<i>w</i> 1 ·								TOD
,	Sine.	D. 1".	Cosine.	D. 1'.	Tang.	D. 1'.	Cotang.	,
0	9.657047 .657295	4.13	9.949881 .949816	1.08	9.707166	5.20	10.292834	60 59
2	.657542	4.12	.949752	1.07	.707790	5.20	292210	58
8	.657790	4.13 4.12	.949688	1.07 1.08	.708102	5.20 5.20	.291898	57
4	.658037	4.12	.949623	1.08	.708414	5.20	.291586	56
5	.658284	4.12	.949558	1.07	.708726	5.18	.291274	55
6	.658531 .658778	4.12	.949494 .949429	1.08	.709087 .709849	5.20	.290963 .290651	54 53
8	.659025	4.12	.949364	1.08	.709660	5.18	.290840	52
9	.659271	4.10	.949800	1.07	.709971	5.18	.290029	51
10	659517	4.10 4.10	.949235	1.08 1.08	.710282	5.18 5.18	.289718	50
11	9.659768	4.10	9.949170	1.08	9.710593	5.18	10.289407	49
12 13	.660009 .660255	4.10	949105	1.08	.710904	5.18	.289096	48
14	.660501	4.10	949040	1.08	.711215 .711525	5.17	.288785 .288475	47 46
15	660746	4.08	.948910	1.08	.711886	5.18	.288164	45
16	.660991	4.08	.948845	1.08	.712146	5.17	.287854	44
17	. 661236	4.08 4.08	.948780	1.08	.712456	5.17	.287544	48
18	.661481	4.08	.948715	1.08 1.08	.712766	5.17 5.17	.287234	42
19	.661726	4.07	. 948650	1.10	.718076	5.17	.286924	41
20	.661970	4.07	.948584	1.08	.718886	5.17	.286614	40
21 22	9.662214 .662459	4.08	9.948519 948454	1.08	9.713696	5.15	10.286804 .285995	39 38
23	.662703	4.07	.948888	1.10	.714005 .714814	5.15	.285686	37
24	662946	4.05	.948323	1.08	.714624	5.17	285376	36
25	.663190	4.07	.948257	1.10	.714983	5.15	285067	35
26	.663433	4.05 4.07	.948192	1.08 1.10	.715242	5.15 5.15	.284758	84
27	.663677	4.05	.948126	1.10	.715551	5.15	.284449	33
28	.663920	4.05	.948060	1.08	715860	5.13	.284140	82
29 80	.664163 .664406	4.05	.947995	1.10	.716168	5.15	.283832	31
	******	4.03	.947929	1.10	.716477	5.13	283523	80
81 32	9.664648 .664891	4.05	9.947863	1 10	9.716785	5 18	10.283215 .282907	29 28
88	.665133	4.08	947797	1.10	.717093 .717401	5.13	.282599	27
84	.665875	4.08	947665	1.10	717709	5.13	.282291	26
85	.665617	4.08 4.08	.947600	1.08	.718017	5.18	281983	25
86	.665859	4.03	. 947533	1.12 1.10	.718325	5.18 5.18	.281675	24
87	.666100	4.08	.947467	1.10	.718633	5.12	.281367	23
38 39	.666342 .666588	4.02	.947401	1.10	.718940	5.13	. 281060	22
40	.666824	4.02	.947335	1.10	.719248 .719555	5.12	. 280752 . 280445	21 20
1		4.02		1.10		5.12		
41	9.667065	4.00	9 947203	1 12	9.719862	5.12	10.280138	19
42	.667305	4.02	.947136 .947070	1.10	.720169 .720476	5.12	279831 279524	18 17
44	.667786	4.00	947004	1.10	.720783	5.12	.279217	16
45	.668027	4.02	.946937	1.12	.721089	5.10	.278911	15
46	668267	3.98	.946871	1.10 1.12	.721396	5.12 5.10	.278604	14
47	.668506	4.00	946804	1.10	.721702	5.12	.278298	13
48 49	.668746 .668986	4.00	.946788	1.12	.722009 .722315	5.10	.277991	12 11
50	669225	8.98	.946671 .946604	1.12	.722315	5.10	.277685 .277379	10
51	9.669464	8.98	9.946588	1.10	9.722927	5.10	10.277073	9
52	669703	8.98	.946471	1.12	728232	5.08	.276768	8
53	.669942	3.98 3.98	.946404	1.12 1.12	723538	5.10 5.10	276462	8
54	670181	3.97	946337	1.12	.728844	5.08	276156	6
55	670419	8.98	.946270	1.12	724149	5.08	. 275851	5
56	.670658	8.97	946203	1.12	.724454	5.10	.275546	4 3
57 58	670896	8.97	.946136 .946069	1.12	724760 725065	5.08	275240 274935	2
59	.671372	8.97	946002	1.12	725370	5.08	.274630	1
60	9.671609	8.95	9.945935	1.12	9.725674	5.07	10.274326	ô
-	Cosine.	D. 1'.	Sine.	D. 1".	Cotang.	D. 1'.	Tang.	—
	John .	. 2	· NAMO.	<i>-</i> 2. 1 .	. Journey.	<i>-</i> 2.1.	Tome.	

				_				101
,	Sine.	D. 1".	Cosine.	D. 1".	Tang.	D. 1'.	Cotang.	,
0	9.671609	3.97	9.945935	1.12	9.725674	5.08	10.274826	60
1 2	.671847 .672084	8.95	. 945868 . 945800	1.13	.725979 .726284	5.08	.274021 .278716	59 58
ã	.672321	8.95	945733	1.12	726588	5.07	.273412	57
4	.672558	8.95	.945666	1.12	726892	5.07	.278108	56
5	.672795	8.95	.945598	1.13	.727197	5.05	.272808	55
6	.673032	3.95	.945531	1.12	.727501	5.07	.272499	54
7	.673268	8.93	.945464	1.12	.727805	5.07	.272195	58
8	.673505	3.95	.945396	1.18	.728109	5.07	.271891	52
9	.673741	3.93 3.93	.945328	1.18 1.19	.728412	5.05 5.07	.271588	51
10	.673977	3.93	.945261	1.13	.728716	5.07	.271284	50
11	9.674213	3.92	9.945198	1.18	9.729020	5.05	10.270980	49
12	.674448	3.93	.945125	1.12	.729323	5.05	.270677	48
13	.674684	3.92	.945058	1.13	.729626	5.05	.270874	47
14	.674919	3.93	.944990	1.18	.729929	5.07	.270071	46
15 16	.675155 .675890	3.92	.944922 .944854	1.13	.780233 .730535	5.03	.269767 .269465	45
17	.675624	3.90	.944834	1.13	.730838	5.05	.269162	44 43
18	.675859	8.92	.944718	1.13	.731141	5.05	.268859	42
19	.676094	8.92	.944650	1.18	.781444	5.05	.268556	41
20	.676328	3.90 3.90	.944582	1.18 1.18	.781746	5.03 5.03	.268254	40
21	9.676562		9.944514		9.732048		10.267952	39
22	.676796	3.90	.944446	1.13	.732351	5.05	.267649	38
23	.677030	3.90	.944377	1.15 1.13	.732653	5.08 5.08	.267347	87
24	.677264	3.90 3.90	.944309	1.13	.782955	5.03	.267045	36
25	.677498	3.88	.944241	1.15	.733257	5.02	.266743	35
26	.677731	3.88	.944172	1.13	.738558	5.08	.266442	84
27	.677964	8.88	.944104	1.13	.738860	5.08	.266140	88
28 29	.678197	8.88	.944036 .943967	1.15	.734162	5.02	.265838 .265537	32 31
30	.678430 .678663	3.88	.943907	1.13	.784468 .784764	5.02	.265236	80
1	1	8.87	11	1.15	1	5.03	l	
81	9.678895	8.88	9.943830	1.15	9.735066	5.02	10.264934	29
82	.679128	8.87	.948761	1.13	.735367	5.02	.264688 .264832	28
34	.679360 .679592	8.87	.943693 .943624	1.15	.735668 .735969	5.02	.264081	27 26
35	.679824	3.87	.943555	1.15	.736269	5.00	.263781	25
86	.680056	8.87	.943486	1.15	.736570	5.02	.263430	24
37	.680288	8.87	.943417	1.15	.736870	5.00	.263130	28
38	.680519	3.85	.943348	1.15	.787171	5.02	.262829	22
39	.680750	3.85 3.87	.943279	1.15 1.15	.787471	5.00 5.00	.262529	21
40	.680982	8.85	.943210	1.15	.737771	5.00	. 262229	20
41	9.681213	3.83	9.948141	1.15	9.738071	5.00	10.261929	19
42	.681448	3.85	.942072	1.15	.738371	5.00	.261629	18
43	.681674	3.85	.943003	1.15	.738671	5.00	.261329 .261029	17 16
44	.681905 .682135	8.83	.942934 .942864	1.17	.788971 .739271	5.00	.260729	15
46	.682865	3.83	.942795	1.15	.789570	4.98	.260430	14
47	.682595	8.83	.942726	1.15	.789870	5.00	.260130	18
48	.682825	8.83	.942656	1.17	.740169	4.98	.259831	12
49	.683055	3.83	.942587	1.15	.740468	4.98	. 259532	11
50	.683284	8.82 8.83	.942517	1.17 1.15	.740767	4.98 4.98	.259288	10
51	9.683514	3.82	9.942448	1.17	9.741066	4.98	10.258934	9
52	.683743	3.82	.942378	1.17	.741865	4.98	.258635	8
53	683972	3.82	.942308	1.15	.741664	4.97	.258336 .258038	7
54	.684201	3.82	.942239	1.17	.741962 .742261	4.98	.257739	5
56	.684658	3.80	.942099	1.17	.742559	4.97	.257441	4
57	.684887	8.82	.942029	1.17	.742858	4.98	.257142	8
58	.685115	3.80	.941959	1.17	.748156	4.97	.256844	2
59	. 685343	3.80 3.80	. 941889	1.17 1.17	.748454	4.97 4.97	. 256546	1
60	9.685571	0.00	9.941819	1.11	9.743752	4.01	10.256248	0
7	Cosine.	D. 1'.	Sine.	D. 1'.	Cotang.	D. 1'.	Tang.	7

29°								190-
,	Sine.	D. 1'.	Cosine.	D. 1*.	Tang.	D. 1'.	Cotang.	
0	9.685571	3.80	9.941819	1.17	9.743752	4.97	10.256248	60.
1	.685799	3.80	.941749	1.17	.744050	4.97	.255950	59
2	.686027	3.78	.941679	1.17	.744348 .744645	4.95	. 255652 . 255355	58 57
8 4	.686254 .686482	3.80	.941539	1.17	.744943	4.97	.255057	56
5	.686709	3.78	.941469	1.17 1.18	.745240	4.95 4.97	.254760	55
6	.686986	3.78 3.78	.941398	1.17	.745588	4.95	.254462	54
7	.687163	8.77	.941328	1.17	.745835	4.95	.254165 .253868	53 52
8	.687389 .687616	3.78	.941258 .941187	1.18	.745132 .746429	4.95	.253571	51
10	.687848	3.78	.941117	1.17	.746726	4.95 4.95	.253274	50
11	9, 688069	8.77	9.941046	1.18	9.747028		10.252977	49
12	.688295	8.77	.940975	1.18	.747819	4.93	.252681	48
18	.688521	8.77 8.77	.940905	1.17 1.18	.747616	4.95 4.95	. 252384	47
14	.688747	8.75	.940884	1.18	.747913	4.93	.252087	46
15	.688972 .689198	3.77	.940763 .940693	1.17	.748209	4.93	.251791 .251495	45 44
16 17	.689423	8.75	.940622	1.18	.748801	4.93	.251199	43
18	.689648	8.75	.940551	1.18	.749097	4.93	.250903	42
19	.689873	3.75 3.75	.940480	1.18 1.18	.749393	4.93 4.93	.250607	41
20	.690098	8.75	.940409	1.18	.749689	4.93	.250311	40
21	9.690323	3.75	9.940888		9.749985	4.93	10.250015	39
22	.690548	3.73	.940267	1.18 1.18	.750281	4.92	.249719	88
23	.690772	8.73	.940196	1.18	.750576	4.93	.249424	37
24	.690996 .691220	3.73	.940125 .940054	1.18	.750872 .751167	4.92	.249128 .248833	36 35
25 26	.691220	8.73	.989982	1.20	.751462	4.92	.248538	84
97	.691668	8.73	.939911	1.18	.751757	4.92	.248243	33
27 28	.691892	8.73	.939840	1.18 1.20	.752052	4.92 4.92	.247948	33 32
29	.692115	3.72 3.73	.939768	1.18	.752347	4.92	.247653	81
30	.692339	8.72	.939697	1.20	.752642	4.92	.247358	30
81	9.692562	8.72	9.939625	1.18	9.752937	4.90	10.247063	29
82	.692785	8.72	.939554	1.20	.753231	4 92	.246769	28 27
33 34	.693008 .693231	8.72	.939482	1 20	.753526 .753820	4.90	.246474 .246180	26
85	.693453	8.70	.939339	1.18	.754115	4.92	.245885	25
36	693676	3.72 3.70	.939267	1.20 1.20	.754409	4.90 4.90	.245591	24
87	.693898	8.70	.939195	1.20	.754708	4.90	245297	23
88	.694120	8.70	.939123	1.18	.754997	4.90	. 245003	22
39 40	.694342 .694564	8.70	.939052	1.20	.755291 .755585	4.90	.244709 .244415	21 20
	1	8.70	1	1.20	l l	4.88		
41	9.694786	3.68	9.938908	1.20	9.755878 .756172	4.90	10.244122 .248828	19 18
43	.695229	8.70	.988768	1.22	.756465	4.88	.248535	17
44	.695450	3.68 3.63	.938691	1.20 1.20	.756759	4.90 4.88	.243241	16
45	.695671	8.68	.938619	1.20	.757052	4.88	.242948	15
46	.695892	3.68	.938547	1.20	.757345	4.88	.242655	14
47 48	.696113 .696334	8.68	.938475 .938402	1.22	.757638 .757981	4.88	.242362	13 12
49	.696554	3.67	938330	1.20	.758224	4.88	241776	ii
50	.696775	3.68 3.67	.938258	1.20 1.22	.758517	4.88 4.88	.241483	10
51	9.696995		9.938185		9.758810		10.241190	9
52	697215	3.67 3.67	.938113	1.20 1.22	.759102	4.87 4.88	.240898	8
53	.697435	8.65	.938040	1.22	.759395	4.87	. 240605	7
54	.697654	3.67	.937967	1.20	.759687	4.87	240313	6
55 56	.697874	3.67	.937895	1.22	.759979	4.88	.240021 .239728	5 4
57	.698318	3.65	.937749	1.22	.760561	4.87	.239436	3
58	.698532	8.65 8.65	.937676	1.22 1.20	.760856	4.87	.239144	2
59	.698751	3.65	.937604	1.22	.761148	4.87	.238852	1
60	9.698970	0.00	9.937531	1.2	9.761439	4.00	10.238561	0
1	Cosine.	D. 1'.	Sine.	D 1'	Cotang.	D 1'	Tang.	—
	Обино.		. Dinc.	· D. I	· Journey.	. D. I .		

Sine D. 1' Cosine D. 1' Tang D. 1' Cotang /	30°								149*
1 669189 3.63 987458 1.22 761731 4.67 288269 59 59 59 50 50 50 50 5	,	Sine.	D. 1*.	Cosine.	D. 1'.	Tang.	D. 1*.	Cotang.	1
1 669189 3.63 987458 1.22 761731 4.67 288269 59 59 59 50 50 50 50 5	0	9.698970	0.05	9.987581	1 00	9.761439	4.0=	10.238561	60
2 .09940; 3 .65 .98740; 1 .22 .768213				.987458					59
3 .0896944 3, 63 .987165 1, 22 .762014 4, 85 .287384 56 5 .700063 3, 63 .987165 1, 22 .762806 4, 85 .287103 55 6 .700280 3, 63 .987019 1, 22 .768189 4, 85 .298612 54 8 .700714 3, 63 .986946 1, 22 .768189 4, 85 .298621 53 9 .700493 3, 63 .986979 1, 22 .764461 4, 85 .298620 52 10 .701513 3, 63 .986725 1, 22 .764461 4, 85 .295648 50 11 9.701968 3, 62 .986572 1, 22 .764461 4, 85 .295648 50 12 7.11863 3, 62 .986578 1, 23 .764852 4, 85 .295648 50 12 7.12863 3, 60 .986587 1, 23 .766274 4, 83 .24176 47 </td <td></td> <td></td> <td>8 65</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>58</td>			8 65						58
\$\begin{array}{c} 1.000002 & 3.63 & 387705 & 1.22 & 702897 & 4.85 & 220703 & 55 \\ 6 & 7000280 & 3.63 & 3837092 & 1.22 & 7638188 & 4.85 & 236821 & 54 \\ 7 & 700498 & 3.63 & 387092 & 1.22 & 7638189 & 4.85 & 236821 & 54 \\ 8 & 700716 & 3.62 & 396846 & 1.23 & 763670 & 4.85 & 236821 & 55 \\ 9 & 700498 & 3.63 & 3968572 & 1.22 & 763479 & 4.85 & 236821 & 55 \\ 10 & 701151 & 3.62 & 9966799 & 1.23 & 764661 & 4.85 & 236823 & 52 \\ 11 & 7.71585 & 3.62 & 936652 & 1.23 & 764661 & 4.85 & 236823 & 52 \\ 12 & 7.11585 & 3.62 & 936652 & 1.23 & 764661 & 4.85 & 235639 & 52 \\ 12 & 7.11585 & 3.62 & 936652 & 1.23 & 764661 & 4.85 & 235639 & 52 \\ 13 & 701902 & 3.62 & 936652 & 1.23 & 764661 & 4.85 & 235648 & 50 \\ 14 & 702019 & 3.62 & 936578 & 1.23 & 765614 & 4.85 & 234486 & 46 \\ 15 & 702669 & 3.60 & 936857 & 1.23 & 765605 & 4.83 & 234185 & 45 \\ 17 & 702669 & 3.60 & 936824 & 1.23 & 765605 & 4.83 & 234185 & 45 \\ 17 & 702669 & 3.60 & 936824 & 1.23 & 766685 & 4.83 & 238055 & 44 \\ 18 & 702858 & 3.60 & 936378 & 1.23 & 766675 & 4.83 & 238055 & 44 \\ 18 & 702859 & 3.60 & 936360 & 1.23 & 766685 & 4.83 & 238055 & 44 \\ 18 & 702869 & 3.60 & 936360 & 1.23 & 766685 & 4.83 & 238055 & 44 \\ 18 & 702869 & 3.60 & 936360 & 1.23 & 766685 & 4.83 & 238055 & 44 \\ 19 & 703101 & 3.60 & 936062 & 1.23 & 766685 & 4.83 & 238055 & 44 \\ 19 & 703317 & 3.60 & 936360 & 1.23 & 766685 & 4.83 & 238055 & 44 \\ 19 & 703631 & 3.60 & 936560 & 1.23 & 766985 & 4.83 & 239365 & 44 \\ 19 & 703633 & 3.60 & 936560 & 1.23 & 766985 & 4.83 & 239365 & 44 \\ 22 & 703749 & 3.58 & 935540 & 1.23 & 766985 & 4.83 & 239365 & 44 \\ 22 & 703649 & 3.58 & 935564 & 1.23 & 766985 & 4.83 & 239365 & 44 \\ 22 & 703684 & 3.58 & 935564 & 1.23 & 768992 & 4.82 & 231676 & 83 \\ 22 & 703696 & 3.58 & 935564 & 1.23 & 768992 & 4.82 & 231696 & 85 \\ 22 & 703696 & 3.58 & 935564 & 1.23 & 768992 & 4.82 & 231696 & 85 \\ 22 & 705698 & 3.57 & 935395 & 1.23 & 776967 & 4.83 & 231876 & 85 \\ 23 & 705698 & 3.57 & 935395 & 1.23 & 776967 & 4.83 & 231876 & 85 \\ 23 & 705698 & 3.57 & 935395 & 1.23 & 776967 & 4.83 & 2							4.87		
6							4.85		
7	5								
8 700476	ő		3.63		1.22		4.85		04
9	7			098048					50
10		70.M33	3.62	936872			4.85	985030	
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19	18			.936210	1.20	.766675			42
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22	21	9 703533	1	9 935988		9.767545	l	10.232455	39
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28 .705040 3.57 .935469 1.23 .769571 4.82 .290429 32 29 .705254 3.58 .935395 1.23 .769690 4.82 .290429 32 30 .705469 3.57 .935320 1.25 .770148 4.82 .29152 30 31 9.705683 3.57 .935171 1.23 .771037 4.82 .229574 28 .229573 34 .706326 3.55 .934948 1.25 .771015 4.80 .229565 27 35 .706336 3.57 .934948 1.25 .771105 4.80 .229667 225667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 22667 </td <td>26</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>34</td>	26								34
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50 7.09/90 3.52 9.393747 1.25 9.776195 4.78 10.223805 9 51 9.709041 3.53 9.333747 1.27 9.776195 4.78 10.223805 9 52 7.10153 3.52 9.33590 1.27 7.76768 4.78 223232 7 54 7.10575 3.52 9.33520 1.25 777055 4.78 222232 7 55 7.10786 3.52 933445 1.27 7777342 4.78 222363 4 56 7.10967 3.52 933869 1.27 7777628 4.77 222372 4 57 7.11208 3.52 933293 1.27 7777915 4.78 222968 3 58 7.11419 3.50 933141 1.27 7778486 4.78 223179 2 59 7.11629 3.50 933141 1.25 778486 4.77 221512 1 60 9.711839 3.50 933066 1.25 9.778774 4.77 10.221286 0					1.27	775021	4.78		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$				1	1.25		4.78		
52 .710180 3.52 .933971 1.25 .776482 4.77 .222318 8 53 .710304 3.52 .933596 1.27 .776768 4.78 .222328 7 54 .710575 3.52 .933590 1.27 .777055 4.78 .222368 8 55 .710997 3.52 .933445 1.27 .777342 4.78 .222373 4 56 .711208 3.52 .933393 1.27 .777915 4.78 .222373 4 58 .711419 3.50 .933217 1.27 .778901 4.77 .221790 2 59 .711829 3.50 .933141 1.27 .778488 4.78 .2221512 1 60 9.711839 3.50 9.933066 1.25 9.778774 4.77 10.221226 0			3.53		1.27		4.78		
55 .10304 3.52 .933380 1.27 .777055 4.78 .222345 6 54 .710786 3.52 .933820 1.25 .777055 4.78 .222945 6 55 .710967 3.52 .933869 1.27 .777088 4.77 .222873 4 57 .711208 3.52 .933869 1.27 .777088 4.77 .222873 4 58 .711419 3.52 .933293 1.27 .777915 4.78 .222085 3 59 .711629 3.50 .933141 1.27 .778486 4.77 .221792 2 60 9.711839 3.50 .933066 1.25 .778486 4.77 .221512 1 60 9.711839 3.50 .933066 1.25 .978774 4.77 .221512 1					1.25				8
55 .710786 3.52 .933445 1.25 .777342 4.78 .222658 5 56 .710997 3.52 .933445 1.27 .777342 4.77 .222658 5 57 .711208 3.52 .933293 1.27 .777925 4.78 .222685 5 58 .711419 3.52 .933293 1.27 .7779501 4.78 .2229085 3 59 .711629 3.50 .933141 1.27 .776488 4.78 .221799 2 60 9.711839 3.50 9.933066 1.25 9.778774 4.77 10.221296 0			3.52		1.27		4.78		4
56 710997 3.52 983386 1.27 777628 4.77 222373 4 57 711208 3.52 933393 1.27 777915 4.78 222373 4 58 711419 3.50 933217 1.27 778901 4.77 222378 3 59 711629 3.50 933141 1.27 778901 4.77 221799 3 60 9.711839 3.50 9.933066 1.25 9.778774 4.77 10.221226 0	55	710010	3.52		1.25	7777949	4.78		
57 711208 3.52 .933293 1.27 .777915 4.77 .222085 3 58 711419 3.52 .933217 1.27 .778201 4.77 .221790 2 59 711629 3.50 .933141 1.27 .778488 4.78 .221512 1 60 9.711839 3.50 9.933066 1.25 9.778774 4.77 10.2212266 0	58					777999	4.77	299974	4
58 .711419 3.52 .938217 1.27 .778201 4.76 .221799 2 59 .711629 3.50 .933141 1.27 .778486 4.78 .221799 2 60 9.711839 3.50 9.933066 1.25 9.778774 4.77 10.221296 0						777915	4.78		
59 .711629 3.50 .933141 1.27 .776488 4.77 10.221296 0 60 9.711839 3.50 9.933066 1.25 9.778774 4.77 10.221296 0	58					778201	4.77		2
60 9.711839 3.50 9.933066 1.25 9.778774 4.17 10.221226 0	59					.778488	4.78	.221512	1
Cosine. D. 1'. Sine. D. 1'. Cotang. D. 1'. Tang.	60		a.50		1.20		4.77	10.221226	
Cosine. D. P. Sine. D. P. Cotang. D. P. Tang.	_	1-a -		- 		G-4	- i		<u> </u>
	•	Cosine.	D. 1.	i Sine.	D. 1.	Cotang.	μ. Γ.	Tang.	'

81.	14										
,	Sine.	D. 1*.	Cosine.	D. 1*.	Tang.	D. 1*.	Cotang.				
0	9.711839	2 20	9.983066	1.07	9.778774		10.221226	60			
1	.712050	3.52 3.50	.932990	1.27 1.27	.779060	4.77	.220940	59			
2	.712260	3.48	.932914	1.27	.779346	4.77	.220654	58			
8	.712469	8.50	.932838	1.27	.779632	4.77	.220368	57			
4	.712679	8.50	.982762 .982685	1.28	.779918	4.75	.220082	56			
5 6	.712889 .713098	8.48	.982609	1.27	.780203	4.77	.219797 .219511	55 54			
7	.713308	3.50	.932533	1.27	.780775	4.77	.219225	53			
8	.718517	8.48	.932457	1.27	.781060	4.75	.218940	52			
) ğ	.713726	3.48 3.48	.932380	1.28 1.27	.781346	4.77	.218654	51			
10	.713935	3.48	.932304	1.27	.781631	4.75	.218369	50			
11	9.714144		9.982228		9.781916		10.218084	49			
12	.714352	3.47 3.48	.932151	1.28 1.27	.782201	4.75	.217799	48			
18	.714561	8.47	.932075	1.28	.782486	4.75	.217514	47			
14	.714769	3.48	.931998	1.28	.782771	4.75	.217229	46			
15	.714978	8.47	.931921	1.27	.783056	4.75	.216944	45			
16 17	.715186	3.47	.931845 .931768	1.28	.783341 .783626	4.75	.216659 .216374	44			
18	.715894 .715602	3.47	.931691	1.28	.783910	4.73	.216090	42			
19	.715809	8.45	.931614	1.28	.784195	4.75	.215805	41			
20	716017	8.47	.931537	1.28	.784479	4.78	.215521	40			
21	9.716224	3.45	9.931460	1.28	9.784764	4.75	10.215236	89			
99	.716432	8.47	.931383	1.28	.785048	4.73	.214952	38			
22 23	.716639	8.45	.931306	1.28	.785332	4.73	.214668	37			
24	.716846	8.45	.931229	1.28 1.28	.785616	4.73	.214384	36			
25	.717053	3.45 3.43	.931152	1.28	.785900	4.78	.214100	35			
26	.717259	3.45 3.45	.931075	1.28	.786184	4.78 4.78	.213816	84			
27	.717466	8.45	.930998	1.28	.786468	4.78	.213582	33			
28	.717678	3.43	.930921	1.80	.786752	4.78	.213248	82			
29 80	.717879 .718085	8.43	.930843 .930766	1.28	.787036 .787319	4.72	.212964 .212681	81 80			
		8.43	14	1.80	11	4.78					
81	9.718291	8.48	9.930688	1.28	9.787608	4.72	10.212397	29			
82 83	.718497 .718708	3.43	.930611 .930533	1.80	.787886 .788170	4.78	.212114 .211830	28 27			
84	.718909	8.48	.980456	1.28	.788453	4.72	.211547	26			
85	719114	8.42	.930378	1.80	.788736	4.72	211264	25			
86	719320	8.48	.930800	1.80 1.28	.789019	4.72	.210981	24			
87	719525	3.42 3.42	.930223	1.28	.789302	4.72	.210698	28			
88	.719730	3.42	.980145	1.30	.789585	4.72	.210415	. 22			
89 40	.719935 .720140	3.42	.980067 .929989	1.30	.789868	4.72 4.72	.210132 .209849	21 20			
		3.42		1.80	.790151	4.72		1			
41	9.720845	8.40	9.929911	1.80	9.790434	4.70	10.209566	19			
42 48	.720549	3.42	.929833	1 30	.790716	4.72	.209284	18 17			
44	.720754 .720958	8.40	.929755	1.30	790999	4.70	.209001	16			
45	.721162	3.40	.929599	1.30	.791563	4.70	.208437	15			
46	.721366	8.40	.929521	1.30	.791846	4.72	.208154	14			
47	.721570	8.40 8.40	.929442	1.32	.792128	4.70 4.70	.207872	13			
48	.721774	8.40	.929364	1.80	.792410	4.70	.207590	12			
49	.721978	8.38	.929286	1.32	.792692	4.70	.207308	11			
50	.722181	3.40	.929207	1.30	.792974	4.70	.207026	10			
51	9.722385	3.38	9.929129	1.32	9.793256	4.70	10.206744	9			
52	.722588	8.88	.929050	1.80	.793538	4.68	.206462	8			
58	.722791	8.88	.928972	1.32	.793819	4.70	.206181	7			
54 55	.722994 .728197	8.38	.928893	1.30	.794101 .794383	4.70	.205899 .205617	5			
56	.723197	8.38	.928815 .928736	1.82	.794563	4.68	205336	4			
57	.723608	8.38	.928657	1.82	.794946	4.70	.205054	8			
58	.728805	8.87	.928578	1.82	.795227	4.68	.204778	2			
59	.724007	3.87 3.88	.928499	1.82 1.82	.795508	4.68 4.68	.204492	1			
60	9.724210	0.00	9.928420	1.00	9.795783	3.00	10.204211	0			
-	Cooles	D 11	- Cina	D. 1'.	Coton=	D. 1'.	Tong	7			
1	Cosine.	D. 1".	Sine.	D. 1'.	Cotang.	D. 1'.	Tang.	1 '			

32.	COSINE, IANGENIS, AND COTANGENIS. 14									
,	Sine.	D. 1'.	Cosine.	D. 1'.	Tang.	D. 1'.	Cotang.			
0	9.794210		9.928420		9.795789		10.204211	60		
ĭ	.724412	8.37	.928342	1.80	.796070	4.68 4.68	.208930	59		
2	.724614	8.37 8.37	.928263	1.82 1.83	.796851	4.68	.203649	58		
8	.724816	8.85	.998183	1.82	. 796682	4.68	.203368	57		
4	.725017	3.37	.928104	1.32	.796918	4.68	.203087	56		
5	.725219	3.85	.928025	1.32	.797194	4.67	.202806	55		
6	.725420	8.37	.927946	1.82	.797474	4.68	.902526	54		
7	.725622	8.35	.927867	1.83	.797755	4.68	.202245	53		
8	.725823	8.35	.927787	1.82	.798086 .798816	4.67	.201964 .201684	52 51		
9	.726225	8.85	.927708	1.32	.798596	4.67	.201404	50		
10		8.85	11	1.88		4.68				
11	9.726426	8.33	9.927549	1.32	9.798877	4.67	10.201128	49		
12	.726626	8.85	.927470	1.33	.799157	4.67	.200848	48		
13	.726827	8.83	.927390	1.33	.799437	4.67	.200563	47		
14	.727027	8.85	.927810	1.32	.799717	4.67	.200283	46		
15	.727228	8.33	.927281	1.33	.799997	4.67	.200003	45		
16	727428	8 83	.927151	1.33	.800277	4.67	.199728 .199443	44		
17 18	.727828	8.88	.926991	1.33	.800836	4.65	.199164	42		
19	.728027	8.32	.926911	1.83	.801116	4.67	.198884	41		
20	.728227	8.88	.926831	1.88	.801896	4.67	.198604	40		
		8.83		1.33		4.65				
21	9.728427	3.82	9.926751	1.83	9.801675	4.67	10.198325	89		
22	.728626	8.82	.926671	1.88	.801955 .802284	4.65	.198045	38		
23	.728825 .729024	8.82	.926591 .926511	1.33	.802518	4.65	.197766	87		
24 25	.729223	8.82	.926481	1.83	.802792	4.65	.197487 .197208	86 85		
20 26	729422	8.82	.926851	1.33	.803072	4.67	.196928	84		
27	.729621	8.82	926270	1.35	.808351	4.65	.196649	33		
28	729820	8.82	.926190	1.83	.803630	4.65	.196370	82		
29	.780018	8.80	.926110	1.83	.808909	4.65	.196091	81		
80	.780217	8.32	.926029	1.35	.804187	4.63	.195818	30		
31	9.730415	8.30	9.925949	1.33	9.804466	4.65	10.195584	20		
82	.780618	8.30	.925868	1.85	.804745	4.63	.195255	28		
33	.780811	8.80	.925788	1.83	.805028	4.68	.194977	27		
34	.781009	8.80	.925707	1.35	.805802	4 65	.194698	26		
85	.781206	8.28	.925626	1.85	.805580	4.68	.194420	25		
36	.781404	8.30 8.30	.925545	1.85 1.83	.805859	4.65 4.63	.194141	24		
37	.781602	3.28	.925465	1.35	.806187	4.63	.193863	23		
38	.731799	3.28	.925884	1.35	.806415	4.68	.193585	22		
39	.781996	8.28	.925808	1.85	.806693	4.63	.198807	21		
40	.782198	8.28	.925222	1.35	.806971	4.63	.198029	20		
41	9.782890		9.925141		9.807249		10.192751	19		
42	.732587	8.28 3.28	.925060	1.35 1.35	.807527	4.63 4.63	.192478	19		
43	.732784	3.27	.924979	1.37	.807805	4.68	.192195	17		
44	.782980	8.28	.924897	1.85	.808088	4.63	. 191917	16		
45	.738177	8.27	.924816	1.85	.808361	4.62	.191639	15		
46	.733378	3.27	.924785	1.35	.808688	4.63	.191362	14		
47	.783569	3.27	.924654	1.87	.808916	4.62	.191084	13		
48	.783765 .783961	8.27	.924572	1.35	.809193	4.68	.190807	12		
49 50	.784157	3.27	.924491	1.87	.809471 .809748	4.62	.190529 .190252	11 10		
		8.27		1.85		4.62				
51	9.734353	3.27	9.924828	1.37	9.810025	4.62	10.189075	9		
52	.784549	3.25	.924246	1.87	.810802	4.63	.189698	8		
58	.784744	3.25 3.25	.924164	1.35	.810580	4.62	.189420	7		
54	.784989	8.27	.924088	1.87	.810857	4.62	.189148	6		
55	.735185 .735830	8.25	.924001	1.87	.811184	4.60	.188866 .188590	5		
56 57	735525	8.25	.923919	1.87	.811410 .811687	4.62	.188818	8		
58	.735719	8.23	.928755	1.87	.811964	4.62	.188036	2		
59	.785914	8.25	.928673	1.37	.812241	4.62	.187759	î		
60	9.786109	8.25	9.928591	1.37	9.812517	4.60	10.187483	ô		
		1						-		
-			:			:				

83.								140
,	Sine.	D. 1*.	Cosine.	D. 1*.	Tang.	D. 1'.	Cotang.	,
0	9.736109	3.23	9.923591	1.37	9.812517	4.62	10.187483	60
1 1	.736303	8.25	.923509	1.37	.812794 .813070	4.60	.187206 .186980	59 58
8	.736498 .786692	8.23	.923427 .923345	1.87	.813347	4.62	186653	57
2	. 786886	8.28	923263	1.87	.813623	4.60	.186377	56
4 5	.787080	8.28	.928181	1.87 1.88	.813899	4.60 4.62	.186101	55
l 6	.787274	3.23 3.22	.923098	1.38 1.37	.814176	4.60	.185824	54
7	.787467	8.23	.923016	1.88	.814452	4.60	.185548	58
8	.737661	8.23	.922983	1.37	.814728	4.60	.185272 .184996	52 51
9	.737855 .738048	8.22	.922851 .922768	1.88	.815004 .815280	4.60	.184720	50
10		3.22		1.87		4.58		1 1
11	9.788241	8.22	9.922686	1.38	9.815555	4.60	10.184445	49 48
12	.738434 .738627	8.22	.922608	1.88	.815831 .816107	4.60	.184169 .183898	47
18 14	.788820	8.22	.922438	1.87	.816382	4.58	.188618	46
15	.789013	8.22	.922355	1.88	.816658	4.60 4.58	.188342	45
16	.789206	8.22 8.20	.922272	1.88 1.88	.816933	4.60	.183067	44
17	.789398	8.20	.922189	1.88	.817209	4.58	.182791	48
18	.789590	8.22	.922106	1.38	.817484	4.58	.182516 .182241	42 41
19 20	.789783 .789975	8.20	.922023	1.88	.817759 .818035	4.60	.181965	40
		8.20		1.88		4.58		
21	9.740167	3,20	9.921857	1.38	9.818310 .818585	4.58	10.181690 .181415	39 88
22 23	.740859 .740550	8.18	.921774 .921691	1.88	.818860	4.58	.181140	37
24	.740742	8.20	.921607	1.40	.819185	4.58	.180865	36
25	.740934	8.20	.921524	1.38 1.38	.819410	4.58 4.57	.180590	35
26	.741125	8.18 8.18	.921441	1.40	.819684	4.58	.180816	84
27	.741816	8.20	.921857	1.38	.819959	4.58	.180041	33
28	.741508	8.18	.921274	1.40	.820234 .820508	4.57	.179766 .179492	32 31
29 80	.741699 .741889	8.17	.921190 .921107	1.88	.820783	4.58	179217	30
		8.18		1.40	11	4.57	i i	29
81	9.749080 .749271	3.18	9.921023	1.40	9.821057 .821332	4.58	10.178943 .178668	28
82	.742462	8.18	.920856	1.88	.821606	4.57	178394	27
84	.742652	8.17	.920772	1.40	.821880	4.57 4.57	.178120	26
85	.742842	8.17 8.18	.920688	1.40	.822154	4.58	.177846	25
86	.748083	8.17	.920604	1.40	.822429	4.57	177571	24
87	.743323	8.17	.920520 .920436	1.40	.822703 .822977	4.57	.177297 .177023	23 22
38	.748418 .748602	8.15	.920352	1.40	.823251	4.57	176749	21
40	743792	8.17	.920268	1.40	.823524	4.55	.176476	20
41	9.743982	8.17	9.920184	1.40	9.823798	4.57	10.176202	19
42	.744171	8.15	.920099	1.42	.824072	4.57	175928	18
43	.744861	8.17 8.15	.920015	1.40 1.40	.824345	4.55 4.57	.175655	17
44	.744550	8.15 8.15	.919981	1.42	.824619	4.57	.175381	16
45	.744789	8.15	.919846	1.40	.824893	4.55	.175107 .174834	15
46	.744928	8.15	.919762 .919677	1.42	.825166 .825439	4.55	.174561	14 18
47 48	.745117 .745806	8.15	.919598	1.40	.825713	4.57	174287	12
49	.745494	8.18	.919508	1.42	.825986	4.55	.174014	11
50	.745683	8.15 8.18	.919424	1.40 1.42	.826259	4.55 4.55	.173741	10
51	9.745871		9.919839		9.826532		10.173468	9
52	.746060	8.15	.919254	1.42 1.42	.826805	4.55 4.55	.173195	8
58	.746248	8.18 8.18	.919169	1.40	.827078	4.55	.172922	7
54	.746436	8.13	.919085	1.42	.827351	4.55	.172649 .172876	6 5
55	.746624 .746812	8.18	.919000 .918915	1.42	.827624 .827897	4.55	172108	4
56 57	.740913	8.12	.918830	1.42	.828170	4.55	.171830	3
58	.747187	8.18	.918745	1.42 1.43	.828442	4.53 4.55	.171558	2
59	.747874	8.12 8.18	.918659	1.43 1.42	.828715	4.58	.171285	1
60	9.747562	0.10	9.918574	1.3	9.828987	1.00	10.171013	0
1-	Cosine.	D. 1'.	Sine.	D. 1".	Cotang.	D. 1'.	Tang.	7
L.	,		, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				,	

34.								140-
,	Sine.	D. 1*.	Cosine.	D. 1*.	Tang.	D. 1'.	Cotang.	, '
0	9.747562	3.12	9.918574	1.42	9.828987	4.55	10.171013	60
1	.747749	3.12	.918489	1.42	.829260	4.53	.170740	59
2	.747936	3.12	.918404	1.43	.829532	4.55	.170468	58
8	.748123	3.12	.918318	1.42	.829805	4.53	.170195 .169923	57 56
4	.748310	3,12	.918283 .918147	1.43	.830077 .830349	4.53	.169651	55
5 6	.748497 .748683	8.10	.918062	1.42	830621	4.53	.169879	54
7	.748870	3.12	.917976	1.48	.830893	4.53	.169107	58
8	.749056	8.10	.917891	1.42	.831165	4.53	.168835	52
ğ	.749248	3.12	.917805	1.48	.831437	4.53	.168563	51
10	.749429	3.10 3.10	.917719	1.43 1.42	.831709	4.53 4.53	.168291	50
11	9.749615	8.10	9.917634	1.43	9.831981	4.53	10.168019	49
12	.749801	8.10	.917548	1.43	.832253	4.53	.167747	48
13	.749987	8.08	.917462	1.43	.832525	4.52	.167475	47
14	.750172	8.10	.917376	1.43	.832796	4.53	.167204	46
15	.750358	8.08	.917290	1.43	.833068 .833339	4.52	.166932	45 44
16 17	.750543 .750729	8.10	.917204 .917118	1.43	.833611	4.58	.166661 .166389	43
18	.750914	8.08	.917032	1.48	.833882	4.52	.166118	42
19	.751099	8.08	.916946	1.48	.834154	4.53	.165846	41
20	.751284	3.08 3.08	.916859	1.45 1.43	.834425	4.52 4.52	.165575	40
21	9.751469		9.916773		9.834696	4.52	10.165304	39
22	.751654	3.08 3.08	.916687	1.43 1.45	.834967	4.52	.165033	38
23	.751839	3.00	.916600	1.43	.835238	4.52	.164762	37
24	.752023	3.08	.916514	1.45	.835509	4.52	.164491	86
25	.752208	3.07	.916427	1.43	.835780	4.52	.164220	35
26	.752392	8.07	.916341	1.45	.836051	4.52	.163949	34
27	.752576	8.07	.916254	1.45	.836322	4.52	.163678	33 32
28	.752760 .752944	3.07	.916167	1.43	.836593	4.52	.163407	
29 30	.753128	3.07	.916081 .915994	1.45	.836864 .837134	4.50	.163136 .162866	31 80
		3.07	11	1.45	11	4.52	ì	
31	9.753312	3.05	9.915907	1.45	9.837405	4.50	10.162595	29
82	.753495	3.07	.915820	1.45	.837675	4.52	.162325 .162054	28 27
33	.753679 .753862	3.07	.915783 .915646	1,45	.837946 .838216	4.50	.161784	26
34 35	.754046	3.07	.915559	1.45	.838487	4.52	.161518	25
36	.754229	3.05	.915472	1.45	.838757	4.50	.161243	24
37	754412	3.05	.915385	1.45	.839027	4.50	.160978	23
88	.754595	3.05	.915297	1.47	.839297	4.50	.160703	22
39	.754778	8.05	.915210	1.45	.839568	4.52 4.50	.160432	21
40	.754960	3.03 3.05	.915123	1.45 1.47	.839838	4.50	.160162	20
41	9.755143	3.05	9.915035	1.45	9.840108	4.50	10.159892	19
42	.755326	3.03	.914948	1.47	.840378	4.50	.159622	18
43	.755508	3.03	.914860	1.45	.840648	4.48	.159352 .159083	17 16
44	.755690 .755872	3.03	.914773 .914685	1.47	.640917 .841187	4.50	.158813	15
46	.756054	3.03	.914598	1.45	.841457	4.50	.158548	14
47	.756236	3.03	.914510	1.47	.841727	4.50	158278	13
48	.756418	3.03	.914422	1.47	.841996	4.48	.158004	12
49	.756600	3.03	.914334	1.47	.842266	4.50	.157734	ii
50	.756782	3.03 3.02	.914246	1.47 1.47	.842535	4.48 4.50	.157465	10
51	9.756963	3.02	9.914158	1.47	9.842805	4.48	10.157195	9
52	.757144	3 03	.914070	1.47	.843074	4.48	156926	8
53	.757326	3.02	.913962	1.47	.843343	4.48	.156657	7
54 55	.757507 .757688	3.02	.913894 .913806	1.47	.843612 .843882	4.50	.156388 .156118	5
56	.757869	8.02	.913806	1.47	.843882	4.48	.155849	4
57	.758050	3.02	.913630	1.47	.844420	4.48	.155580	ايةا
58	.758230	8.00	913541	1.48	.844689	4.48	155311	2
59	.758411	3.02	.913453	1.47	.844958	4.48	155042	8 2 1
60	9.758591	3.00	9.913365	1.47	9.845227	4.48	10.154778	ō
-	Cosine.	D. 1'.	Sine.	D. 1*	Cotang.	D. 1'.	Tang.	
L	. 500000				, Journey.			

35-								122
,	Sine.	D. 1'.	Cosine.	D. 1'.	Tang.	D. 1*.	Cotang.	,
0	9.758591 .758772	3.02	9.918865 .918276	1.48	9.845227 .845496	4.48	10.154773 .154504	60 59
2	.758952	3.00	.918187	1.48 1.47	.845764	4.47	.154236	58
8	.759182	3.00 3.00	.918099	1.48	.846033	4.48	.153967	57
4	.759812	8.00	.913010	1.47	.846302	4.47	.153698	56
5	.759492	3.00	.912922	1.48	.846570	4.48	.153430	55
6	.759672	8.00	.912833	1.48	.846839	4.48	.153161	54
7	.759852	2.98	.912744	1.48	.847108	4.47	.152892 .152624	53 52
8	.760031 .760211	8.00	.912655 .912566	1.48	.847376 .847644	4.47	.152356	51
10	.760390	2.98	.912477	1.48	.847913	4.48	.152087	50
111	9.760569	2.98	9.912388	1.48	9.848181	4.47	10.151819	49
12	.760748	2.98	.912299	1.48	.848449	4.47	.151551	48
13	.760927	2.98	.912210	1.48	.848717	4.47	.151283	47
14	.761106	2.98	.912121	1.48	.848986	4.48	.151014	46
15	.761285	2.98	.912081	1.50	.849254	4.47	.150746	45
16	.761464	2.98 2.97	.911942	1.48 1.48	.849522	4.47	.150478	44
17	.761642	2.98	.911853	1.50	.849790	4.45	.150210	43
18	.761821	2.97	.911763	1.48	.850057	4.47	.149943	42
19	.761999	2.97	.911674	1.50	.850325	4.47	.149675	41
20	.762177	2.98	.911584	1.48	.850593	4.47	.149407	40
21	9.762356	2.97	9.911495	1.50	9.850861	4.47	10.149139	39
22	.762534	2.97	.911405	1.50	.851129	4.45	.148871	38
23	.762712	2.95	.911815	1.48	.851396	4.47	.148604	87
24	.762889	2.97	.911226 .911186	1.50	.851664	4.45	.148336 .148069	36 35
25 26 27	.763067 .763245	2.97	.911186	1.50	.851931 .852199	4.47	.147801	34
97	.763422	2.95	.910956	1.50	.852466	4.45	.147534	83
28	.763600	2.97	.910866	1.50	.852733	4.45	.147267	32
29	.763777	2.95	.910776	1.50	.853001	4.47	.146999	81
30	.763954	2.95 2.95	.910686	1.50 1.50	.853268	4.45 4.45	.146732	30
81	9.764181		9.910596		9.853535	Į.	10.146465	90
32	.764308	2.95	.910506	1.50	.853802	4.45	.146198	29 28
88	.764485	2.95	.910415	1.52	.854069	4.45	.145931	27
84	.764662	2.95 2.93	.910825	1.50 1.50	.854336	4.45 4.45	.145664	26
85	.764888	2.95	.910285	1.52	.854603	4.45	.145397	25
36	.765015	2.93	.910144	1.50	.854870	4.45	.145130	24
37	.765191	2.93	.910054	1.52	.855137	4.45	.144868	23 22
38 39	.765867 .765544	2.95	.909963	1.50	.855404 .855671	4.45	.144596	21
40	.765720	2.93	909782	1.52	.855938	4.45	.144062	20
	9.765896	2.93	9.909691	1.52		4.43	10.143796	19
41	.766072	2.93	.909601	1.50	9.856204 856471	4.45	.143529	18
43	.766247	2.92	.909510	1.52	.856737	4.43	143263	17
44	.766423	2.93	.909419	1.52	.857004	4.45	142996	16
45	.766598	2.92	.909828	1.52	.857270	4.43	.142730	15
46	.766774	2.93 2.92	. 909287	1.52	.857537	4.45 4.43	.142463	14
47	.766949	2.92	.909146	1.52 1.52	.857803	4.43	.142197	13
48	.767124	2.93	.909055	1.52	.858069	4.45	.141981	12
49	.767800	2.92	.908964	1.52	.858336 .858602	4.43	.141664	11
50	.767475	2.90		1.53		4.43	.141398	10
51	9.767649	2.92	9.908781	1.52	9.858868	4.43	10.141132	9
52	.767824	2.92	.908690	1.52	.859184	4.43	.140866	8
53 54	.767999 .768173	2.90	.908599	1.53	.859400 .859666	4.43	.140600 .140884	7
55	.768848	2.92	.908416	1.52	859932	4.43	.140068	5
56	768522	2.90	908324	1.53	.860198	4.43	.139802	4
57	.768697	2.92	.908233	1.52	.860464	4.43	.139536	1 3
58	.768871	2.90 2.90	.908141	1.53 1.53	.860730	4.43 4.42	.139270	2
59	.769045	2.90	.908049	1.52	.860995	4.43	.139005	1 1
60	9.769219		9.907958		9.861261	1	10.138739	0
1	Cosine.	D. 1'.	Sine.	D. 1°.	Cotang.	D 1"	Tang.	
1	Cosme.	<i>D</i> . I.	Dine.	D. I.	Cotang.	. ו.ען	Tang.	٠ .

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,	Sine.	D. 1'.	Cosine.	D. 1'.	Tang.	D. 1".	Cotang.	,
0	9.769219	2.90	9.907958 .907866	1.53	9.861261 .861527	4.48	10.138739 .138473	60 59
2	.769566	2.88	.907774	1.53	.861792	4.42	.138208	58
8	.769740	2.90 2.88	.907682	1.53 1.53	.862058	4.43 4.42	.137942	57
4	.769918	2.90	.907590	1.53	.862323	4.43	.137677	56 55
5	.770087	2.88	.907498	1.53	.862589	4.42	.187411	55
6	.770260	2.88 2.88	.907406	1.58	.862854 .863119	4.42	.137146 .136881	54 53
8	.770433 .770606	2.88	.907222	1.58	.863385	4.43	196615	52
9	.770779	2.88	.907129	1.55	.863650	4.42	.136350	51
10	.770952	2.88 2.88	.907037	1.58 1.58	.863915	4.42 4.42	.136085	50
11	9.771125	2.88	9.906945 .906852	1.55	9.864180 .864445	4.42	10.135820 .135555	49
12 13	.771298 .771470	2.87	.906760	1.53	.864710	4.42	.135290	48 47
14	.771643	2.88	.906667	1.55	.864975	4.42	.135025	46
15	.771815	2.87 2.87	.906575	1.58	.865240	4.42 4.42	.134760	45
16	.771987	2.87	.906482	1.55 1.55	.865505	4.42	.134495	44
17	.772159	2.87	.906389	1.55	.865770	4.42	.134230	43
18 19	.772331 .772503	2.87	.906296 .906204	1.53	.866035 .866300	4.42	.133965 .133700	42 41
20	.772675	2.87 2.87	.906111	1.55 1.55	.866564	4.40 4.42	.133436	40
21 22	9.772847 .773018	2.85	9.906018 .905925	1.55	9.866829	4.42	10.133171 .132906	39
23	.773190	2.87	.905832	1.55	.867094 .867358	4.40	132642	38 87
24	.773361	2.85	.905739	1.55	.867623	4.42	.132377	36
25 26	.773533	2.87 2.85	.905645	1.57 1.55	.867887	4.40 4.42	.132113	85
26 27	.773704	2.85	.905552	1.55	.868152	4.40	.131848	84
28	.773875 .774046	2.85	.905459 .905366	1.55	.868416 .868680	4.40	.131584 .131320	33 32
29	.774217	2.85	.905272	1.57	.868945	4.42	.131055	81
30	.774388	2.85 2.83	.905179	1.55 1.57	.869209	4.40 4.40	.130791	30
81	9.774558	2.85	9.905085	1.55	9.869478	4.40	10.130527	29
82 33	.774729 .774899	2.83	.904992	1.57	.869737 .870001	4.40	.130263 .129999	28
84	.775070	2.85	.904804	1.57	.870265	4.40	129735	27 26
35	.775240	2.83 2.83	.904711	1.55 1.57	.870529	4.40 4.40	,129471	25
36	.775410	2.83	.904617	1.57	.870793	4.40	.129207	24
37 38	.775580	2.83	.904523	1.57	.871057	4.40	.128943	28
39	.775750 .775920	2.83	.904429	1.57	.871821 .871585	4.40	.128679 .128415	22 21
40	.776090	2.83 2.82	.904241	1.57 1.57	.871849	4.40 4.38	.128151	20
41	9.776259	2.88	9.904147	1.57	9.872112	4.40	10.127888	19
42	.776429	2.82	.904053	1.57	.872376	4.40	.127624	18
48	.776598 .776768	2.88	.903959 .903864	1.58	.872640 .872903	4.38	.127360 .127097	17 16
45	.776937	2.82	.903770	1.57	.878167	4.40	.126833	15
46	.777106	2.82 2.82	.903676	1.57 1.58	.873430	4.38	.126570	14
47	.777275	2.82	.903581	1.57	.873694	4.40 4.38	.126306	13
48	.777444	2.82	.903487	1.58	.873957	4.38	.126048	12
49 50	.777618 .777781	2.80 2.82	.903392 .903298	1.57 1.58	.874220 .874484	4.40	.125780 .125516	11 10
51	9.777950	2.82	9.903203	1.58	9.874747	4.38 4.38	10.125253	9
52	.778119	2.80	.903108	1.57	.875010	4.38	.124990	8
53 54	.778287 .778455	2.80	.903014	1.58	.875273 .875537	4.40	.124727 .124463	7 6
55	.778624	2.82	.902919	1.58	.875800	4.88	124200	5
56	.778792	2.80	.902729	1.58	876063	4.88	123937	
57	.778960	2.80 2.80	.902634	1.58 1.58	.876326	4.88 4.88	.123674	8
58	.779128	2.78	.902539	1.58	.876589	4.88	.123411	2
59 60	.779295 9.779463	2.80	9.902349	1.58	.876852 9.877114	4.87	.123148 10.122886	1 0
"		7.11		7.				<u> -</u>
Ĺ	Cosine.	D. 1'.	Sine.	D. 1°.	Cotang.	D. 1'.	Tang.	' '

87°		IADL	E A.—L	OGANI	Inmic c	orn Eo,		142°
,	Sine.	D. 1'.	Cosine.	D. 1".	Tang.	D. 1*.	Cotang.	,
0	9.779463	2.80	9.902349	1.60	9.677114	4.88	10.122886	60
1	.779631	2.78	.902253	1.58	.877877	4.88	.122623	59 58
2 3	.779798	2.80	.902158 .902063	1.58	.877640 .877903	4.38	.122360 .122097	57
1 4	.780133	2.78	.901967	1.60	.878165	4.87	.121835	57 56
1 9	.780300	2.78 2.78	.901872	1.58 1.60	.878428	4.88 4.88	. 121572	55 54
6	.780467	2.78	.901776	1.58	.878691	4.87	.121309	54
7 8	.780634	2.78	.901681	1.60	.878953	4.38	.121047	58
8	.780801 .780968	2.78	.901585 .901490	1.58	.879216 .879478	4.37	.120784 .120522	52 51
10	.781134	2.77	.901394	1.60	.879741	4.88	120259	50
111	9.781301	2.78	9.901298	1.60	9.880008	4.87	10.119997	49
1 12	.781468	2.78	.901202	1.60	.880265	4.37	.119785	48
13	.781634	2.77	.901106	1.60 1.60	.880528	4.38	.119472	47
14	.781800	2.77 2.77	.901010	1.60	.880790	4.37 4.37	.119210	46
15	.781966	2.77	.900914	1.60	.881052	4.87	.118948	45
16 17	.782132 .782298	2.77	.900818	1.60	.881814 .881577	4.88	.118686 .118423	44 43
18	.782464	2.77	.900626	1.60	.881839	4.87	.118161	42
19	.782630	2.77 2.77	.900529	1.62 1.60	.882101	4.87 4.87	.117899	41
20	.782796	2.75	.900433	1.60	.882868	4.87	.117637	40
21	9.782961		9.900337	1.62	9.882625	4.37	10.117375	89
1 22	.783127	2.77 2.75	.900240	1.60	.882887	4.35	.117113	38 37 36 35
23	.783292	2.77	.900144	1.62	.883148	4.87	.116852	87
24	.783458 .783623	2.75	.900047 .899951	1.60	.883410 .883672	4.87	.116590 .116328	86
96	.783788	2.75	.899854	1.62	.888934	4.37	.116066	84
25 26 27	.783953	2.75	.899757	1.62	.884196	4.87	.115804	23
28	.784118	2.75 2.73	.899660	1.62 1.60	.884457	4.35 4.37	.115543	82
29	.784282	2.75	.899564	1.62	.884719	4.85	.115281	81
1	.784447	2.75	.899467	1.62	.884980	4.87	.115020	80
81	9.784612	2.73	9.899370	1.62	9.885242	4.87	10.114758	29
32	.784776 .784941	2.75	.899273 .899176	1.62	.885504 .885765	4.85	.114496 .114235	28 27
34	.785105	2.73	.899078	1.63	.886026	4.85	.118974	26
35	.785269	2.73	.898981	1.62 1.62	.886288	4.87 4.85	.113712	25
36	.785433	2.73 2.73	.898884	1.62	.896549	4.87	.118451	24
37	.785597	2.73	.898787	1.63	.886811	4.85	.113189	28 22
38	.785761 .785925	2.73	.898689 .898592	1.62	.887072 .887383	4.35	.112928 .112667	222
40	.786089	2.73	.898494	1.63	.887594	4.85	.112406	20
41	9.786252	2.72	9.898397	1.62	9.887855	4.85	10.112145	19
42	.786416	2.73	.898299	1.63	.888116	4.85	.111884	18
43	.786579	2.72 2.72	898202	1.62 1.63	.888378	4.87 4.85	.111622	17
44	.786742	2.78	.898104	1.63	.888639	4.85	.111861	16
45	.786906 .787069	2.72	.898006	1.63	.888900	4.85	.111100	15
47	.787282	2.72	.897908 .897810	1.63	.889161 .889421	4.33	.110889 .110579	14 18
48	.787395	2.72	.897712	1.63	.869682	4.85	.110818	12
49	.787557	2.70 2.72	.897614	1.63 1.63	.889943	4.35 4.35	.110057	11
50	.787720	2.72	.897516	1.63	.890204	4.85	.109796	10
51	9.787883	2.70	9.897418	1.63	9.890465	4.88	10.109535	9
52	.788045	2.72	.897320	1.63	.890725	4.85	.109275	8
53 54	.788208	2.70	.897222	1.65	.890986	4.85	.109014	7
55	.788370 .788532	2.70	.897123 .897025	1.63	.891247 .891507	4.83	.108753 .108493	5
56	.788694	2.70	.896926	1.65	.891768	4.85	.108282	4
56 57	.788856	2.70 2.70	.896828	1.63 1.65	892028	4.88 4.85	.107972	8
58	.789018	2.70	.896729	1.63	.89:2289	4.88	.107711 .107451	2
59 60	789180 9.789342	2.70	.896631 9.896582	1.65	.892549 9.892810	4.85	10.107451	1 0
	o.100042		a.080002		a.088010		10.10/190	
L'	Cosine.	D 1'.	Sine.	D. 1'.	Cotang.	D. 1'.	Tang.	'

38°	COUNTED, TANGENTS, AND COTANGENTS,							
,	Sine.	D. 1'.	Cosine.	D. 1'.	Tang.	D. 1*.	Cotang.	
0	9.789342		9.896532		9.892810		10.107190	60
ĭ	.789504	2.70	.896433	1.65 1.63	.893070	4.33	.106930	59
2	.789665	2.68 2.70	.896335	1.65	.893331	4.85 4.33	.106669	58
8	.789827	2.68	.896236	1.65	.893591	4.83	.106409	57
4	.789988	2.68	.896137	1.65	.893851	4.33	.106149	56
5 6	.790149 .790310	2.68	.896038 .895939	1.65	.894111 .894372	4.35	.105889 .105628	55 54
ž	.730471	2.68	.895840	1.65	.894632	4.33	.105368	53
8	790632	2.68	.895741	1.65	.894892	4.83	.105108	52
ğ	790798	2.68 2.68	.895641	1.67 1.65	.895152	4.33 4.33	.104848	51
10	.790954	2.68	.895542	1.65	.895412	4.33	.104588	50
11	9.791115		9.895443		9.895672		10.104328	49
12	.791275	2.67	.895343	1.67 1.65	.895932	4.33 4.33	.104068	48
13	.791436	2.68 2.67	.895244	1.65	.896192	4.33	.103808	47
14	.791596	2.68	.895145	1.67	.896452	4.88	.103548	46
15	.791757	2.67	.895045	1.67	.896712	4.82	.103288	45
16	.791917	2.67	.894945	1.65	.896971 .897231	4.83	.103029	44
17 18	.792077	2.67	.894846 .894746	1.67	.897491	4.33	.102509	42
19	792397	2.67	.894646	1.67	.897751	4.33	102249	41
20	.792557	2.67	.894546	1.67	.898010	4.32	.101990	40
21	9.792716	2.65	9.894446	1.67	9.898270	4.33	10.101730	39
22	.792876	2.67	.894346	1.67	.898530	4.83	101470	38
22 23	.793035	2 65	.894246	1.67	.898789	4.82	.101211	37
24	.793195	2.67 2.65	.894146	1.67 1.67	.899049	4.33 4.82	.100951	36
25	.793354	2.67	.894046	1.67	.899308	4.33	.100692	35
26	.793514	2.65	.893946	1.67	.899568	4.32	.100432	34
24 25 26 27 28	.793673	2.65	.893846 .893745	1.68	.899827 .900087	4.83	.100173	33 32
29	793991	2.65	.893645	1.67	.900346	4.32	.099654	81
30	.794150	2.65	.893544	1.68	.900605	4.32	.099395	30
		2.63	9.893444	1.67	9.900864	4.82	10.099186	
31 32	9.794308	2.65	.893343	1.68	.901124	4.83	.098876	29
33	794620	2.65	.893243	1.67	.901883	4.32	.098617	23 27 26 25
34	.794784	2.63 2.63	.893142	1.68 1.68	.901642	4.32	.098358	26
35	.794942	2.65	.893041	1.08	.901901	4.82	.098099	25
36	.795101	2.63	.892940	1.68	.902160	4.33	.097840	24
37	.795259	2.63	.892839	1.67	.902420	4.82	.097580	23 22 21
38 89	.795417 .795575	2.63	.892739 .892638	1.68	.902679	4.32	.097321	22
40	.795733	2.63	.892536	1.70	.903197	4.32	.096808	20
		2.63	11	1.68	11	4.82	1	
41 42	9.795891 .796049	2.63	9.892435 .892334	1.68	9.903456	4.30	10.096544	19 18
43	.796206	2.62	.892233	1.68	.903973	4.32	.096027	17
44	.796364	2.63	.892132	1.68	904232	4.82	.095768	16
45	.796521	2.62 2.63	.892030	1.70 1.68	.904491	4.32	.095509	15
46	.796679	2.62	.891929	1.70	.904750	4.80	.095250	14
47	.796836	2.62	.891827	1.68	.905008	4.32	.094992	18
48	.796993	2.62	.891726	1.70	.905267	4.82	.094733	12
49 50	.797150 .797307	2.62	.891624 .891523	1.68	905785	4.82	.094474	11 10
	1	2.62	!	1.70	11	4.80	1	1
51	9.797464	2.62	9.891421	1.70	9.906043	4.82	10.093957	9
52 53	.797621	2.60	.891319 .891217	1.70	.906302	4.80	.093698	8
54	797934	2.62	.891115	1.70	.906819	4.32	.093181	6
55	.798091	2.62	891013	1.70	.907077	4.30 4.82	.092923	5
56	.798247	2.60 2.60	.890911	1.70 1.70	.907886	4.82	.092664	4
57	.798403	2.62	.890809	1.70	.907594	4.83	.092406	3
58 59	.798560	2.60	.890707	1.70	.907853	4.30	.092147	2
59 60	9.798716	2.60	.890605 9.890503	1.70	9.908369	4.30	.091889 10.091681	1 0
	8.100012		#. C#UU0		a. a00000		10.031061	انسا
,	Cosine.	D. 1'.	Sine.	D. 1'.	Cotang.	D. 1'.	Tang.	·

38"								140
,	Sine.	D. 1*.	Cosine.	D. 1'.	Tang.	D. 1".	Cotang.	,
0	9.798872 .799028	2.60 2.60	9.890503 .890400	1.72 1.70	9.908369 .908628	4.82	10.091631 .091872	60 59
2	.799184	2.58	.890298	1.72	.909886	4.80 4.80	.091114	58
8	.799839	2.60	.890195	1.70	.909144	4.80	.090856	57
5	.799495 .799651	2.60	.890093 .889990	1.72	.909402 .909660	4.30	.090598	56 55
l a	.799806	2.58	.889888	1.70	.909918	4.30	.090340	54
6 7 8	.799962	2.60	.889785	1.72	.910177	4.32	.089823	53
8	.800117	2.58 2.58	.889682	1.72	.910435	4.80	.089565	52
9	.800272	2.58	.889579	1.72 1.70	.910693	4.80 4.30	.089307	51
10	.800427	2.58	.889477	1.72	.910951	4.30	.089049	50
11	9.800582	2.58	9.889374	1.72	9.911209	4.30	10.088791	49
12	.800737	2.58	.889271	1.72	.911467	4.30	.088533	48
18	.800892	2.58	.889168	1.73	.911725	4.28	.088275	47
14	.801047 .801201	2.57	.889064 .888961	1.72	.911982 .912240	4.30	.088018 .087760	46 45
16	.801356	2.58	.888858	1.72	.912498	4.80	.087502	44
17	.801511	2.58	.888755	1.72	.912756	4.30	.087244	48
18	.801665	2.57 2.57	.888651	1.73 1.79	.913014	4.30 4.28	.086986	42
19	.801819	2.57	.888548	1.73	.913271	4.30	.086729	41
20	.801973	2.58	.888444	1.72	.913529	4.30	.086471	40
21	9.802128	2.57	9.888341	1.73	9.913787	4.28	10.086213	39
22	.802282	2.57	.888237	1.72	.914044	4.30	.085956	38 37
23 24	.802436 .802589	2.55	.888134 .888030	1.73	.914302	4.30	.085698	36
25	.802743	2.57	.887926	1.73	.914560 .914817	4.28	.085440 .085183	35
25 26	.802897	2.57	.887822	1.73	.915075	4.30	.084925	34
27	.809050	2.55 2.57	.887718	1.73	.915332	4.28	.084668	33
28	.803204	2.55	.887614	1.73 1.73	.915590	4.30 4.28	.084410	82
29	.808357	2.7	.887510	1.73	.915847	4.28	.084153	38 82 31 30
30	.808511	2.55	.887406	1.73	.916104	4.30	.083896	
81	9.803664	2.55	9.887302	1.73	9.916362	4.28	10.083638	29
32 33	.803817 .803970	2.55	.887198 .887093	1.75	.916619 .916877	4.30	.083381	28
34	.804123	2.55	.886989	1.73	.917134	4.28	.082866	27 26
95	.804276	2.55 2.55	.886885	1.73	.917391	4.28	.082609	25
86 87	.804428	2.55	.886780	1.75 1.73	.917648	4.28 4.30	.082352	24
87	.804581	2.55	.886676	1.75	.917906	4.28	.082094	23
38	.804734 .804886	2.53	.886571 .886466	1.75	.918163 .918420	4.28	.081837	22 21
40	.805039	2.55	.886362	1.73	.918420	4.28	.081580	20
1		2.53		1.75		4.28	1	
41 42	9.805191 .805343	2.53	9.886257 .886152	1.75	9.918934 .919191	4.28	10.081066	19 18
48	.805495	2.53 2.53	.886047	1.75	.919448	4.28	.080552	17
44	.805647	2.53	.885942	1.75 1.75	.919705	4.28 4.28	.080295	16
45	.805799	2.53	.885837	1.75	.919962	4.28	.080038	15
46 47	.805951 .806108	2.53	.885732 .885627	1.75	.920219	4.28	.079781	14
48	.806254	2.52	.885522	1.75	.920476 .920733	4.28	.079524 .079267	18 12
49	.806406	2.53	.885416	1.77	.920990	4.28	.079010	11
50	.806557	2.52 2.53	.885311	1.75 1.77	.921247	4.28 4.27	.078753	10
51	9.806709	1	9.885205		9.921503		10.078497	9
52	.806860	2.52 2.52	885100	1.75	.921760	4.28 4.28	.078240	8 1
58	.807011	2.53	884994	1.75	.922017	4.28	.077983	7
54 55 56 57	.807163	2.52	884889	1.77	.922274 .922530	4.27	.077726	8
56	.807314 .807465	2.52	884783 884677	1.77	.922787	4.28	.077470 .077213	%
57	.807615	2.50	884572	1.75	.923044	4.28	.076956	8
58	.802766	2.52 2.52	884466	1.77	.923300	4.27 4.28	.076700	7 6 5 4 8 2
59	.807917	2,50	884360	1.77	.923557	4.28	.076443	1
60	9.808067	7,00	9.884254	1	9.923814	4.20	10.076186	0
—	Cosine.	D. 1'.	Sine.	D. 1".	Cotang.	D. 1'.	Tang.	
L'		. 2			- Journal L	J. 1 .	. Iang.	

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,	Sine.	D. 1'.	Cosine.	D. 1*.	Tang.	D. 1'.	Cotang.	,
0	9.808067 .808218	2.52	9.884254 .884148	1.77	9.928814	4.27	10.076186 .075930	60 59
2	.808368	2.50 2.52	.884042	1.77	924327	4.28	.075678	58
8	.808519	2.52	.888936	1.77 1.78	.924583	4.28	.075417	57
4	.808669 .808819	2.50	.883829 .883723	1.77	.924840 .925096	4.27	.075160 .074904	56
5 6	.808969	2.50	.883617	1.77	.925852	4.27	.074648	55 54
7	.809119	2.50 2.50	.883510	1.78 1.77	.925609	4.28	.074891	53
8 1	.809269	2.50	.883404	1.78	.925865	4.28	.074185	52
10	.809419 .809569	2.50	.883297 .883191	1.77	.926122	4.27	.073878 .073622	51 50
		2.48		1.78		4.27		1 1
11 12	9.809718 .809868	2.50	9.883084	1.78	9.926634	4.27	10.078866 .078110	49 48
13	.810017	2.48	.882871	1.77	.927147	4.28	.072858	47
14	.810167	2.50 2.48	.882764	1.78 1.78	.927403	4.27	.072597	46
15	.810316	2.48	.882657	1.78	.927659	4.27	.072841	45
16 17	.810465 .810614	2.48	.882550 .882443	1.78	.927915 .928171	4.27	.072085 .071829	44
18	.810763	2.48	.882336	1.78	.928427	4.27	.071578	42
19	.810912	2.48 2.48	.882229	1.78 1.80	.928684	4.28	.071316	41
20	.811 061	2.48	.882121	1.78	.928940	4.27	.071060	40
21	9.811210	2.47	9.882014	1.78	9.929196	4.27	10.070804	39 38
22	.811358	2.48	.881907	1.80	.929452	4.27	.070548	38
23 24	.811507 .811655	2.47	.881 799 .881 692	1.78	.929708	4.27	.070292 .070036	87 86
95	.811804	2.48	.881584	1.80	.930220	4.27	.069780	85
26 27	.811952	2.47 2.47	.881477	1.78 1.80	.930475	4.25	.069525	84
27	.812100	2.47	.881369	1.80	.930731	4.27	.069269	33
28 29	.812248 .812396	2.47	.881261 .881153	1.80	.930987	4.27	.069018 .068757	32 31
30	.812544	2.47	.881046	1.78	.931499	4.27	.068501	30
81	9.812692	2.47	9.880938	1.80	9.931755	4.27	10.068245	20
32	.812840	2.47	.880830	1.80	.932010	4.25	.067990	98
33	.812988	2.47 2.45	.880722	1.80 1.82	.932266	4.27	.067734	27 26
34	.818185	2.47	.880618	1.80	.932522	4.27	.067478	26
35 36	.813283 .813430	2.45	.880505 .880397	1.80	.982778	4.25	.067222	25 24
37	.813578	2.47 2.45	.880289	1.80	.933289	4.27	.066711	23
38	.813725	2.45	.880180	1.80	.938545	4.25	.066455	223
39 40	.813872 .814019	2.45	.880072	1.82	.988800 .984056	4.27	.068200	21 20
		2.45	1	1.80	11	4.25		
41 42	9.814166 .814313	2.45	9.879855 .879746	1.82	9.934811	4.27	10.065689	19 18
43	.814460	2.45	.879637	1.82	.934822	4.25	.065178	17
44	.814607	2.45 2.43	.879529	1.80	.935078	4.27	.064922	16
45	.814753	2.45	.879420	1.82	.935888	4.27	.064667	15
46	.814900 .815046	2.43	.879311 .879202	1.82	.935589	4.25	.064411	14 18
48	.815193	2.45	.879093	1.82	.986100	4.27	.068900	12
49	.815339	2.43 2.43	.878984	1.82	.986855	4.25	.068645	11
50	.815485	2.45	.878875	1.82	.936611	4.25	.063389	10
51	9.815632	2.43	9.878766	1.83	9.936866	4.25	10.068184	9
52 53	.815778 .815924	2.48	.878656 .878547	1.82	.937121	4.27	.062628	8 7
54	.816069	2.42	.878438	1.82	.937632	4.25	.062368	6
55	.816215	2.43 2.43	.878328	1.83	.937887	4.25 4.25	.062118	5
56	.816361	2.43	.878219	1.83	.988142	4.27	.061858	4
57 58	.816507 .816652	2.42	.878109 .877999	1.83	.988898	4.25	.061602 .061847	3
59	.816798	2.43	.877890	1.82	.938908	4.25	.061092	1 1
60	9.816943	2.42	9.877780	1.83	9.989168	4.25	10.060887	0
 -	Cosine.	D. 1'.	Sine.	D. 1'.	Cotang.	D. 1º	Tang.	
L				~	Journey.	·		•

41°		IADL	ь лп	UGARI	ILWIC 9	1N.65,		138°
'	Sine.	D. 1".	Cosine,	D. 1'.	Tang.	D. 1".	Cotang.	•
0	9.816943	2 42	9.877780	1 00	9.939163	4.05	10.060837	60
1	.817088	2.42 2.42	.877670	-1.83 1.83	.939418	4.25 4.25	.060582	59
2	.817233	2.43	.877560	1.83	.939673	4.25	.060827	58
3	.817379	2.42	.877450	1.83	.939928	4.25	.060072	57
5	.817524 .817668	2.40	.877340 .877230	1.83	.940183 .940439	4.27	.059817 .059561	56 55
6	.817813	2.42	.877120	1.83	.940694	4.25	.059306	54
7	.817958	2.42	.877010	1.83	.940949	4.25	.059051	53
8	.818103	2.42	.876899	1.85 1.83	.941204	4.25 4.25	.058796	52
9	.818247	2.40 2.42	.876789	1.85	.941459	4.23	.058541	51
10	.818392	2.40	.876678	1.83	.941713	4.25	.058287	E)
11	9.818536	2.42	9.876568	1 .	9.941968	4.25	10.058032	49
12	.818681	2.42	.876457	1.85 1.83	.942228	4.25	.057777	48
13	.818825	2.40	.876347	1.85	.942478	4.25	.057522	47
14	.818969	2.40	.876236	1.85	.942733	4.25	.057267	46
15 16	.819113 .819257	2.40	.876125	1.85	.942968	4.25	.057012 .056757	45 44
17	.819401	2.40	.876014 .875904	1.83	.943498	4.25	.056502	43
18	.819545	2.40	.875793	1.85	.943752	4.23	.056248	42
19	.819689	2.40 2.38	.875682	1.85 1.85	.944007	4.25 4.25	.055993	41
20	.819832	2.40	.875571	1.87	.944262	4.25	.055738	40
21	9.819976		9.875459		9.944517		10.055488	89
22	.820120	2.40	.875348	1.85	.944771	4.23	.055229	88
23	.820263	2.88 2.88	.875237	1.85 1.85	.945026	4.25 4.25	.054974	37
24	.820406	2.40	.875126	1.87	.945281	4.23	.054719	36
25	.820550	2.38	.875014	1.85	.945535	4.25	.054465	35
26	820693 820836	2.38	.874908 .874791	1.87	.945790	4.25	.054210 .058955	84 83
27	.820979	2.38	.874680	1.85	.946299	4.23	.053701	32
29	.821122	2.38	.874568	1.87	.946554	4.25	.058446	81
30	.821265	2.38 2.37	.874456	1.87	.946808	4.23 4.25	.058192	30
81	9.821407		9.874344	1.87	9.947063		10.052987	20
32	.821550	2.38	.874232	1.87	.947318	4.25	.052682	28
33	.821693	2.38 2.37	.874121	1.85 1.87	.947572	4.23 4.25	.052428	27
84	.821835	2.87	.874009	1.88	.947827	4.23	.052173	26 25
85	.821977	2.38	.873896	1.87	.948081	4.23	.051919	25
86	.822120 .822262	2.37	.873784	1.87	.948335	4.25	.051665	24
37 38	.822404	2.37	.873672 .873560	1.87	.948844	4.23	.051410 .051156	23 22
89	.822546	2.37	.873448	1.87	.949099	4.25	.050901	21
40	.822688	2.37 2.37	.873335	1.88 1.87	.949353	4.23 4.25	.050647	20
41	9.822830		9.873223	1	9.949608		10.050392	19
42	.822972	2.87	.878110	1.88	.949862	4.23	.050138	18
43	.823114	2.37 2.35	.872998	1.88	.950116	4.25	.049884	17
44	.823255	2.37	.872885	1.88	.950871	4.23	.049629	16
45	. 823397 . 823539	2.37	.872772	1.88	.950625	4.28	.049375	15
46 47	.823680	2.35	.872659 .872547	1.87	.950879	4.23	.049121	14
48	.823821	2.85	.872434	1.88	.951388	4.25	.048612	12
49	823963	2.37	.872321	1.88	.951642	4.23	.048358	iĩ
50	.824104	2.35 2.35	.872208	1.88	.951896	4.23	.048104	10
51	9.824245	2.35	9.872095	1.90	9.952150	4.25	10.047850	9
52	.824386	2.35	.871981	1.88	.952405	4.23	.047595	8
58	.824527	2.35	.871868	1.88	.952659	4.23	.047841	7
54	.824668 .824808	2.33	.871755 .871641	1.90	.952913	4.23	.047087 .046833	6
55 56 57	.824949	2.35	.871528	1.88	.953421	4.28	.046579	4
57	825090	2.35	.871414	1.90	.953675	4.23	.046325	8
I KR	.825230	2.33 2.35	.871301	1.88	.953929	4.28 4.28	.046071	2
59	.825371	2.33	.871187	1.90	.954183	4.23	.045817	1
60	9.825511	1	9.871073		9.954437	1	10.045568	0
1	Cosine.	D. 1'.	Sine.	D. 1".	Cotang.	D. 1'.	Tang.	1

131.

Sine D. 1' Cosine D. 1' Tang D. 1' Cotang /	4 2 °	<u> </u>	COSINE	s, TANGE	N18, A.	ND COTAL	NGENT	s. 	187*
1	,	Sine.	D. 1*.	Cosine.	D. 1'.	Tang.	D. 1'.	Cotang.	,
1 825651 2.38 870466 1.90 954466 4.28 0.46500 57 882691 2.38 870561 1.90 955454 4.28 0.44600 57 85651 2.38 870504 1.90 955454 4.28 0.44600 57 85651 2.38 870504 1.90 955454 4.28 0.44600 57 85651 2.38 870504 1.90 955454 4.28 0.44600 57 85651 2.38 870504 1.90 955451 4.28 0.44600 57 85651 2.38 870504 1.90 955451 4.28 0.44600 57 85651 2.38 870504 1.90 955451 4.28 0.44600 57 85651 2.38 870504 1.90 955451 4.28 0.44600 57 85651 2.38 870504 1.90 955451 4.28 0.44600 57 85651 2.38 870504 1.90 955451 4.28 0.44600 57 85651 2.38 870504 1.90 955451 4.28 0.44600 57 85651 2.38 870504 1.90 955451 4.28 0.44600 57 85651 2.38 870504 1.90 955451 4.28 0.44600 57 85651 2.38 870504 1.90 955451 4.28 0.44600 57 85651 2.38 870504 1.90 955451 4.28 0.44600 57 85651 2.38 870504 1.90 955451 4.28 0.44600 57 85651 2.38 860704 1.90 956677 4.28 0.44600 57 85651 2.38 860704 1.90 957739 4.28 0.44600 57 85651 2.38 860704 1.90 957739 4.28 0.44600 57 85651 2.38 860704 1.92 957739 4.28 0.44600 57 85651 2.38 860704 1.92 957739 4.28 0.44600 57 85651 2.38 860704 1.92 957739 4.28 0.44600 4.28 0.44600 57 85651 2.38 860704 1.92 957739 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28 0.44600 4.28	0	9.825511	0.00	9.871073	1.00	9.954437	4 00	10.045568	60
2 825791 4 32 4 32 4 32 4 4		.825651	2.88				4.23		
Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second S		.825791	2.00	.870846			4.20		
5							4 28		
6				.870618			4.28	.044546	
7				.870504			4.22	.0442898	
8				970978			4.23	049708	
9							4.28		
10							4.28		
11 9.827049 2.83 9.869618 1.90 9.957251 4.23 10.042769 49 12 327189 2.82 869659 1.92 957789 4.23 0.42251 47 14 327467 2.82 8696474 1.92 957969 4.23 0.42261 47 15 327606 2.82 869680 1.92 957969 4.23 0.41500 44 16 327745 2.82 86961 1.92 958500 4.22 0.41500 44 17 327684 2.82 869180 1.92 956804 4.23 0.41178 45 18 328023 2.82 869180 1.92 956804 4.23 0.41178 45 19 328023 2.82 869180 1.92 956806 4.23 0.41246 43 19 328023 2.82 86960 1.92 956806 4.23 0.40078 41 19 328023 2.82 86960 1.92 956806 4.23 0.40078 41 19 328023 2.82 86860 1.92 956802 4.23 0.40078 41 20 328801 2.80 868765 1.92 956961 4.22 0.40084 40 21 9.83849 2.82 86860 1.92 9.950769 4.23 0.40084 40 21 9.83849 2.82 86860 1.92 9.950769 4.23 0.40084 40 21 9.83849 2.82 86860 1.92 9.950769 4.23 0.40084 40 22 3.825716 2.82 868640 1.92 9.950769 4.23 0.40083 42 23 328716 2.80 868608 1.92 9.90030 4.23 0.30977 38 24 328565 2.80 86868 1.92 9.90030 4.23 0.30977 38 24 328565 2.80 86868 1.92 9.90030 4.23 0.30977 38 25 328969 2.80 86868 1.92 9.90030 4.23 0.30977 38 26 329131 2.80 86868 1.92 9.90030 4.23 0.30977 38 27 32969 2.80 86778 1.92 9.90030 4.23 0.30970 83 28 329407 2.80 867781 1.93 9.90030 4.23 0.30970 83 28 329407 2.80 867781 1.93 9.90030 4.23 0.30970 83 28 329407 2.80 867781 1.93 9.90360 4.23 0.30970 83 30 829683 2.30 867761 1.93 9.90360 4.23 0.30970 83 31 9.83961 2.80 867681 1.93 9.90360 4.23 0.30970 83 32 82969 2.80 86686 1.93 9.96381 4.23 0.30970 83 33 830097 2.80 867761 1.93 9.96360 4.23 0.30970 83 34 83024 2.28 86660 1.95 9.96360 4.23 0.30971 82 36 83059 2.80 86680 1.93 9.96380 4.23 0.30971 82 37 830646 2.28 86660 1.95 9.96360 4.23 0.30971 10 38 83196 2.28 86660 1.95 9.96360 4.23 0.30983 17 34 83196 2.28 86660 1.95 9.96360 4.23 0.30971 10 35 838195 2.28 86660 1.95 9.96360 4.23 0.30981 17 36 83196 2.28 86660 1.95 9.96360 4.23 0.30981 17 36 83298 2.29 86660 1.95 9.96380 4.22 0.30983 11 36 83298 2.29 86660 1.95 9.96380 4.22 0.30983 11 36 83298 2.29 86660 1.95 9.96380 4.22 0.30983 11 36 83298 2.29 86660 1.96 9.96380 4.22 0.30983 11 36 83298 2.29 86660 1.96 9.96380 4					1.90		4.28		50
12			2.82		1.98		4.23		1
13			2.88		1.90		4.28		
14							4.23		
15							4.23		
16							4.28		
17							4.22		
13					1.92		4.28		48
19	13				1.9%		4.23		42
21 9.838499 2.30 9.848670 1.92 9.50769 4.23 10.04021 39 22 8.838578 2.30 8.86840 1.92 9.00023 4.23 10.04021 38 23 8.838578 2.30 8.86824 1.92 9.00023 4.23 0.3973 36 25 8.839631 2.30 8.86824 1.92 9.000590 4.23 0.39747 38 26 8.839131 2.30 8.868093 1.92 9.000590 4.23 0.39747 38 27 8.839299 2.30 8.67973 1.92 9.000590 4.23 0.39747 38 28 8.839407 2.30 8.67973 1.92 9.000590 4.23 0.39746 38 29 8.839407 2.30 8.67973 1.92 9.000590 4.23 0.39746 38 29 8.839407 2.30 8.67973 1.92 9.000590 4.23 0.39708 38 29 8.839407 2.30 8.67973 1.93 9.000590 4.23 0.39708 38 30 8.839639 2.30 8.67767 1.93 9.000590 4.23 0.39708 33 31 9.839631 2.30 8.67631 1.93 9.000593 4.23 0.39746 33 32 8.839699 2.30 8.67767 1.93 9.000593 4.23 0.39746 32 33 8.830674 2.30 8.67838 1.93 9.000593 4.23 0.007440 28 35 8.830690 2.30 8.67838 1.93 9.000593 4.23 0.007494 29 36 8.830609 2.30 8.67836 1.93 9.000593 4.23 0.007494 29 37 8.80640 2.28 8.66835 1.93 9.00067 4.23 0.00688 26 38 8.830764 2.30 8.66819 1.93 9.00057 4.23 0.00688 26 38 8.830764 2.30 8.66819 1.93 9.00057 4.23 0.00688 20 39 8.831832 2.23 8.66861 1.95 9.00057 4.23 0.00688 20 39 8.831832 2.23 8.66861 1.95 9.00057 4.23 0.006890 25 30 8.831852 2.23 8.668670 1.93 9.00057 4.23 0.006890 25 34 8.831852 2.23 8.668670 1.95 9.00057 4.23 0.006890 25 34 8.831852 2.23 8.668670 1.95 9.00057 4.23 0.006495 4.23 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495 4.24 0.006495					1.9%		4.23		41
21 9.889459 2.32 9.868670 1.92 9.95769 4.23 10.040231 88 22 889576 2.30 888455 1.92 9.00023 4.23 0.39778 37 24 889855 2.30 888440 1.92 9.00023 4.23 0.39778 37 24 889855 2.30 888824 1.92 9.000590 4.23 0.39778 37 25 889993 2.30 880783 1.92 9.00590 4.23 0.39470 38 26 889407 2.30 867783 1.92 9.01392 4.23 0.39778 38 28 889407 2.30 867783 1.92 9.01592 4.23 0.39778 38 28 889407 2.30 867787 1.93 9.01592 4.23 0.39778 38 29 889658 2.30 867787 1.93 9.01545 4.23 0.39778 38 30 889683 2.30 867787 1.93 9.01799 4.23 0.38455 32 31 9.839821 2.30 867781 1.93 9.02056 4.23 0.39403 30 31 9.839821 2.30 867781 1.93 9.00052 4.23 0.39470 38 32 889699 2.30 867787 1.93 9.00052 4.23 0.39403 30 31 9.839821 2.30 867781 1.93 9.00052 4.23 0.39403 30 32 889699 2.30 867781 1.93 9.00052 4.23 0.39403 30 33 880097 2.30 867787 1.93 9.00052 4.23 0.39403 30 35 830509 2.30 867787 1.93 9.00052 4.23 0.39403 30 36 889683 2.30 867681 1.93 9.00362 4.23 0.37440 29 36 889689 2.30 867667 1.93 9.00057 4.22 0.37187 72 36 889690 2.23 866865 1.93 9.00077 4.22 0.00083 26 36 830509 2.23 866865 1.93 9.00374 4.23 0.00083 26 37 830646 2.30 866670 1.93 9.00482 4.23 0.00083 26 38 830784 2.23 866895 1.93 9.003674 4.23 0.00083 26 38 830784 2.23 866895 1.93 9.003674 4.23 0.00083 26 38 830784 2.23 866670 1.93 9.00482 4.23 0.00083 26 39 830981 2.28 866896 1.95 9.00482 4.23 0.00083 26 41 9.831195 2.28 866896 1.95 9.00482 4.23 0.00083 26 41 9.831195 2.28 866896 1.95 9.00482 4.23 0.00083 26 42 831879 2.27 865897 1.95 9.006809 4.22 0.00083 11 43 832108 2.28 866891 1.95 9.006809 4.22 0.00083 11 44 831606 2.28 866896 1.95 9.006809 4.22 0.000890 11 45 831679 2.27 865896 1.95 9.006809 4.22 0.00083 11 46 831679 2.27 865896 1.95 9.006809 4.22 0.00083 11 47 832105 2.28 866896 1.95 9.006809 4.22 0.00083 11 48 832989 2.27 865896 1.95 9.000809 4.22 0.00083 11 49 832388 2.27 865896 1.95 9.006809 4.22 0.00083 11 40 831696 2.29 866896 1.95 9.000809 4.22 0.000809 11 40 831696 2.29 866896 1.95 9.000809 4.22 0.000809 11 40 831696 2.29 866896 1.95 9.000809 4.22 0.000809 11 40 831696 2.29 866896 1	20	.828301		.868785	1.86	.959516	4.20	.040484	40
22	21	0.898480	1	9 868670	ŀ	0.050280		10 040991	80
24 .889855 2.90 .886824 1.92 .990530 4.23 .039470 36 26 .89131 2.90 .868039 1.92 .901088 4.23 .03216 35 27 .839269 2.30 .867681 1.92 .961292 4.23 .038702 34 29 .839645 2.30 .867747 1.93 .961793 4.23 .038455 32 30 .839683 2.30 .867781 1.93 .961793 4.22 .038455 32 31 9.839683 2.30 .867781 1.93 .96250 4.23 .03748 30 32 .8396921 2.30 .867399 1.93 .96250 4.23 .037440 28 33 .830067 2.28 .867389 1.93 .96350 4.23 .037187 27 34 .830234 2.28 .867389 1.93 .96350 4.23 .037187 27 28 .6		828578							88
24 .889855 2.90 .886824 1.92 .990530 4.23 .039470 36 26 .89131 2.90 .868039 1.92 .901088 4.23 .03216 35 27 .839269 2.30 .867681 1.92 .961292 4.23 .038702 34 29 .839645 2.30 .867747 1.93 .961793 4.23 .038455 32 30 .839683 2.30 .867781 1.93 .961793 4.22 .038455 32 31 9.839683 2.30 .867781 1.93 .96250 4.23 .03748 30 32 .8396921 2.30 .867399 1.93 .96250 4.23 .037440 28 33 .830067 2.28 .867389 1.93 .96350 4.23 .037187 27 34 .830234 2.28 .867389 1.93 .96350 4.23 .037187 27 28 .6		.828716							87
25	24	.828855							186
27	25				1.92				85
28		.829131		.868098				.038962	
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31 9 839831 2 30 9 867315 1 93 9 963306 4 23 10.037694 29 867399 1 93 963067 4 32 10.037694 28 83 83 83097 2 30 867767 1 93 963067 4 23 037187 27 8 830842 2 30 867767 1 93 963067 4 23 036680 25 8 86805 1 93 963320 4 23 036680 25 8 86805 1 93 963320 4 23 036680 25 8 86805 1 93 963874 4 23 036493 25 8 8 830764 2 30 866703 1 93 963867 4 23 036493 2 24 8 86686 1 95 96485 4 23 036172 23 8 86686 1 95 96485 4 23 036493 2 24 9 886686 1 95 96485 4 23 036693 2 24 9 886686 1 95 96485 4 23 036693 2 24 9 886686 1 95 96485 4 23 036693 2 24 9 886686 1 95 96485 4 23 036693 2 24 9 886686 1 95 96485 4 23 036693 2 24 9 886686 1 95 96485 4 23 036693 2 24 9 886686 1 95 96485 4 23 036693 2 24 9 886686 1 95 96485 4 23 036693 2 24 9 886686 1 95 96485 4 23 036693 2 24 9 886686 1 95 96485 4 23 036613 2 2 2 2 2 886687 1 95 964686 4 23 036413 2 2 2 2 8 86627 1 95 96606 4 2 2 03685 1 2 2 2 2 2 8 86627 1 95 96606 4 2 2 03685 1 2 2 2 2 2 8 86627 1 95 96606 4 2 2 03685 1 2 2 2 2 2 2 8 86685 1 95 96685 4 2 2 03645 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2					1.93	.961799	4.22		81
32 839969 2.30 887399 1.93 962560 4.23 067440 28 33 830097 2.30 887389 1.93 962813 4.23 067187 28 34 830234 2.30 887167 1.93 963820 4.23 069838 26 35 830572 2.23 866815 1.93 963820 4.23 068690 25 37 83046 2.23 866819 1.93 963820 4.23 066172 23 38 830784 2.30 866703 1.93 963823 4.23 066172 23 40 831058 2.23 866860 1.95 964835 4.22 065172 23 41 9.831195 2.23 966383 1.93 964884 4.23 065615 21 42 831323 2.23 966393 1.93 964884 4.23 0686172 22 068636 2.2 064835	80			.867681	1.93	.962052		.037948	80
32			990	9.867515	1.00		4 00	10.037694	29
34 .830284 2.28 .801239 1.98 .963007 4.28 .030983 26 35 .830509 2.28 .966935 1.98 .963320 4.22 .036690 22 37 .830660 2.28 .966935 1.93 .963824 4.23 .086426 24 38 .830784 2.30 .966703 1.93 .963828 4.22 .066172 23 39 .830981 2.23 .966703 1.93 .964385 4.22 .065172 23 40 .831058 2.23 .866703 1.95 .964586 4.22 .065605 21 41 9.831195 2.23 .866270 1.95 .964586 4.23 .064412 20 43 .831469 2.28 .866297 1.95 .965084 4.23 .004905 18 44 .831693 2.98 .866120 1.95 .96602 4.22 .034651 17 <t< td=""><td></td><td></td><td></td><td>.867399</td><td>1.90</td><td></td><td></td><td></td><td>28</td></t<>				.867399	1.90				28
35 .830372 2.30 .897051 1.98 .963820 4.93 .036680 25 36 .830692 2.28 .866935 1.98 .963820 4.23 .086496 25 37 .830646 2.28 .866819 1.98 .963820 4.23 .086122 23 38 .830784 2.30 .866861 1.93 .964835 4.23 .086912 2.23 39 .830921 2.23 .866866 1.95 .964835 4.23 .03665 2.23 40 .831068 2.23 .86687 1.95 .964836 4.23 .036612 20 42 .831492 2.23 .866237 1.95 .966488 4.23 .036413 20 44 .831606 2.28 .866120 1.95 .965946 4.23 .034951 17 45 .831742 2.27 .86587 1.95 .96592 4.22 .034896 16 <t< td=""><td></td><td></td><td></td><td>.867288</td><td>1.80</td><td></td><td></td><td>.037187</td><td>27</td></t<>				.867288	1.80			.037187	27
38 .830609 2.28 .86835 1.93 .968374 4.28 .06428 24 37 .830464 2.30 .896819 1.93 .963824 4.22 .066172 22 39 .830981 2.28 .866703 1.95 .964961 4.22 .085612 22 40 .831088 2.28 .866703 1.95 .964961 4.22 .085665 21 40 .831088 2.28 .866701 1.95 .964984 4.22 .085665 21 42 .831392 2.28 .86637 1.95 .964942 4.23 .085412 20 43 .831469 2.28 .86637 1.95 .96595 4.22 .084905 18 44 .831602 2.27 .886087 1.95 .965602 4.22 .08495 16 45 .831742 2.27 .866537 1.95 .965602 4.22 .08398 16 47 <td></td> <td></td> <td></td> <td></td> <td>1.98</td> <td>.963067</td> <td>4.22</td> <td>.036988</td> <td>26</td>					1.98	.963067	4.22	.036988	26
37 .830646 2.28 .866819 1.98 .963828 4.28 .066173 23 38 .830784 2.28 .966696 1.95 .964081 4.28 .066919 22 40 .831058 2.28 .966596 1.95 .964583 4.28 .085619 22 41 9.831195 2.28 .966383 1.93 .964583 4.22 .065412 20 42 .831382 2.28 .966383 1.93 .965095 4.23 .064905 18 43 .831469 2.28 .866120 1.93 .965492 4.22 .084651 17 44 .831606 2.27 .866087 1.95 .965695 4.22 .084651 17 46 .831879 2.28 .865770 1.95 .966955 4.22 .08495 16 47 .832015 2.27 .86538 1.95 .966952 4.22 <t>.083891 14</t>					1.98	.963320	4.28		
88 830764 2.30 .986708 1.98 .964081 4.23 .085919 32 39 830921 2.23 .966866 1.95 .964383 4.23 .035665 22 40 831088 2.23 .966470 1.95 .964583 4.23 .035665 20 41 9.831195 2.23 .986327 1.95 .964583 4.23 .036413 20 42 .831449 2.23 .866227 1.95 .965046 4.23 .084905 18 44 .831606 2.23 .866024 1.95 .965049 4.22 .084905 17 45 .831742 2.27 .86587 1.95 .96502 4.22 .08495 15 46 .831879 2.27 .865633 1.95 .966302 4.22 .034898 16 47 .832015 2.27 .865633 1.95 .966302 4.23 .033881 13 49<			2.28		1.98		4.28	.086420	
89 830921 2.22 966566 1.95 964935 4.22 035645 21 40 831058 2.23 966470 1.93 964688 4.22 035412 20 41 9.831195 2.28 9.66683 1.93 964842 2.23 10.085158 19 42 831382 2.28 9.66937 1.95 965942 4.22 10.085158 19 44 831606 2.27 866004 1.95 965095 4.22 034651 12 45 .831742 2.23 .866770 1.95 .966902 4.22 034651 12 46 .831879 2.27 .86653 1.95 .966902 4.22 038691 14 47 .8320152 2.28 .865870 1.95 .966910 4.23 038691 14 48 .832152 2.28 .865302 1.95 .966966 4.23 038394 12 50							4.23		20
40					1.95		4.28		
41 9.831195 2.28 9.866853 1.95 9.66695 4.22 10.085188 19 42 .831839 2.28 9.66190 1.95 9.66095 4.22 0.84905 18 43 .831499 2.28 9.66190 1.95 9.66095 4.22 0.84905 18 44 .831606 2.28 8.86004 1.93 9.65602 4.22 0.84898 16 45 .831742 2.27 .865887 1.95 9.66502 4.22 0.84898 16 46 .831879 2.27 .865887 1.95 9.66109 4.22 0.83891 14 47 .832015 2.28 .86503 1.95 9.66362 4.22 0.83891 15 48 .832152 2.28 .86536 1.95 9.66362 4.22 0.83891 15 49 .832288 2.27 .865896 1.95 9.66616 4.22 0.83898 13 49 .832288 2.27 .865896 1.95 9.66616 4.22 0.83898 13 50 .83245 2.28 .865302 1.95 9.66616 4.22 0.83898 13 50 .83245 2.27 .86596 1.95 9.667123 4.23 0.83131 11 50 .83245 2.27 .86596 1.95 9.67723 4.22 0.83917 19 52 .832897 2.27 9.865185 1.95 9.67723 4.22 10.03271 8 53 .832893 2.27 .864898 1.95 9.67829 4.29 10.03271 8 54 .832969 2.27 .864898 1.95 9.68588 4.22 0.3217 6 55 .833105 2.27 .864898 1.95 9.68589 4.22 0.3217 6 56 .833241 2.27 .864898 1.95 9.68648 4.22 0.31164 6 57 .333877 2.27 .864898 1.95 9.68648 4.22 0.31164 5 58 .8338512 2.27 .864898 1.95 9.68648 4.22 0.31164 5 58 .8338512 2.27 .864898 1.97 9.686498 4.22 0.31104 3 58 .8338512 2.27 .864898 1.97 9.686498 4.22 0.31104 3 58 .8338512 2.25 .864898 1.97 9.686408 4.22 0.31104 3 58 .8338512 2.25 .864898 1.97 9.696408 4.22 0.31104 3 58 .8338512 2.25 .864898 1.97 9.696408 4.22 0.31104 3 58 .8338512 2.25 .864898 1.97 9.696408 4.22 0.31104 3 58 .8338512 2.25 .864898 1.97 9.696408 4.22 0.31104 3 58 .8338512 2.25 .864898 1.97 9.696408 4.22 0.31104 3 58 .8338512 2.25 .864898 1.97 9.696408 4.22 0.31104 3 58 .8338512 2.25 .864898 1.97 9.696408 4.22 0.31104 3 58 .8338512 2.25 .864898 1.97 9.696408 4.22 0.31104 3 58 .8338512 2.25 .864898 1.97 9.696408 4.22 0.31104 3 58 .8338512 2.25 .864898 1.97 9.696408 4.22 0.31104 3 58 .8338512 2.25 .864898 1.97 9.696408 4.22 0.31104 3 58 .8338512 2.25 .864898 1.97 9.696408 4.22 0.31104 3 58 .8338512 2.25 .864898 1.97 9.696408 4.22 0.31104 3 58 .8338512 2.25 .864898 1.97 9.696408 4.22 0.31104 3							4.22		90
42 831832 2.28 868237 1.36 965095 4.22 084905 18 43 831469 2.28 86604 1.95 965849 4.22 084851 17 44 831606 2.27 886004 1.95 965805 4.22 084896 16 45 831742 2.27 886887 1.95 965805 4.22 084845 17 47 832015 2.27 886887 1.95 966805 4.22 083891 14 48 832152 2.28 86505 1.95 966810 4.22 083891 14 49 832288 2.27 886596 1.95 966866 4.22 083891 11 50 832425 2.28 86590 1.95 96686 4.22 083894 12 50 83245 2.27 886596 1.95 96686 4.22 083891 11 50 83245 2.27 886596 1.95 96686 4.22 083891 11 50 83245 2.27 886596 1.95 967829 4.22 083891 11 50 83245 2.27 886596 1.95 967829 4.22 08391 11 50 83246 2.27 886596 1.95 967829 4.22 08391 11 50 83246 2.27 884896 1.95 967829 4.22 10.03294 9 52 832897 2.27 884896 1.95 967829 4.22 10.03294 9 53 832897 2.27 884896 1.95 968896 4.22 032117 7 54 832969 2.27 884896 1.95 968198 4.22 10.03294 7 55 833105 2.27 884896 1.95 968198 4.22 032117 7 56 833105 2.27 884896 1.95 968396 4.22 031104 3 57 833877 2.27 884896 1.97 968896 4.22 031104 3 58 833812 2.25 884896 1.97 968966 4.22 031104 3 58 833812 2.25 884896 1.97 968966 4.22 031104 3 58 833812 2.25 884896 1.97 968496 4.22 031104 3 58 833812 2.25 884896 1.97 968496 4.22 031104 3 59 838648 2.27 884496 1.97 968496 4.22 031104 3 59 838648 2.27 884496 1.97 968496 4.22 031104 3 59 838648 2.27 884496 1.97 969496 4.22 031104 3 59 838648 2.27 884496 1.97 969496 4.22 031104 3 59 838648 2.27 884496 1.97 969496 4.22 031104 3 59 838648 2.27 884496 1.97 969496 4.22 031104 3 59 838648 2.27 884496 1.97 969496 4.22 031104 3 59 838648 2.27 884496 1.97 969496 4.22 031104 3 59 838648 2.27 884496 1.97 969496 4.22 031104 3 59 838648 2.27 884496 1.97 969496 4.22 031104 3			2.28		1.95		4.23		1
43 .831449 2.28 .896120 1.95 .966349 4.28 .034851 17 44 .831606 2.28 .866024 1.98 .965602 4.22 .034896 16 45 .831742 2.27 .86587 1.95 .965602 4.22 .03495 15 46 .831879 2.27 .86563 1.95 .96502 4.23 .033891 14 47 .832015 2.27 .86563 1.95 .966362 4.23 .033891 14 48 .832152 2.27 .86563 1.95 .966616 4.23 .033891 14 49 .832288 2.27 .865619 1.95 .966362 4.23 .033891 11 50 .832455 2.27 .865619 1.95 .967123 4.23 .033891 11 51 9.832561 2.27 .965088 1.95 .967123 4.22 .033871 11 52<					1.98			10.085158	
198					1.95		4.28	0044900	10
46 .831879 2.28 .86587 1.35 .965805 4.23 .084145 154 .831879 2.27 .86585 1.35 .966109 4.23 .0383891 14 .832152 2.28 .865636 1.95 .966362 4.23 .0383891 154 .832152 2.28 .865636 1.95 .966616 4.22 .038381 11 .95 .966362 4.23 .038381 11 .95 .966362 4.23 .038381 11 .95 .966362 4.23 .038381 11 .95 .966362 4.23 .038381 11 .95 .966362 4.23 .038381 11 .95 .966362 4.23 .038381 11 .95 .966362 4.23 .038381 11 .95 .966362 4.23 .038381 11 .95 .966362 4.23 .038381 11 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .038381 12 .95 .966362 4.23 .966362 4.23 .966362 4.23 .966362 4.23 .966362 4.23 .966362 4.23 .966362 4.23 .966362 4.23 .966362 4.23 .966362 4.23 .966362 4.23 .966362 4.23 .966362 4.23 .966362 4.23 .966362 4.23 .966362 4.23 .966362 4.23 .966362 4.23 .966362			2.28				4.22	1002001	16
46		881749	2.27		1.95			084145	
47 833015 2.26 805683 1.95 966866 4.23 033384 12 49 83298 2.27 865419 1.95 966616 4.23 033384 12 50 832425 2.27 865419 1.95 966869 4.23 033381 11 50 832425 2.27 865419 1.95 967123 4.23 033877 1 51 9 832661 2.27 9.85185 1.95 967123 4.23 033877 1 52 832637 2.27 9.85185 1.95 967123 4.23 033877 1 53 832833 2.27 864853 1.95 967829 4.23 032117 7 54 832969 2.27 864833 1.95 967829 4.23 032117 7 55 833105 2.27 86498 1.95 96383 4.23 032117 5 56 83341 2.27 86498 1.95 96383 4.23 031864 6 57 833571 2.27 86498 1.97 968643 4.23 031857 5 58 833512 2.25 86496 1.97 968443 4.23 031104 3 58 833512 2.25 86496 1.97 968443 4.23 031104 3 58 833512 2.25 864481 1.95 963843 4.22 031104 3 59 833648 2.27 864481 1.97 968443 4.23 031107 5 59 833648 2.27 864481 1.97 968403 4.23 031104 3 59 983648 2.27 964481 1.97 969403 4.23 031507 1 60 9.833783 2.25 864425 1.97 969403 4.23 030597 1		831879	2.28		1.95			093991	
48		.832015	2.27		1.95			.033638	13
49	48	.832152		.865586	1.95			.038384	12
51 9 832561 2 27 9.85185 1 .95 9.87376 4 .92 10.03294 9 52 832697 2 .27 9.86508 1 .95 9.67329 4 .92 10.03291 8 53 832693 2 .27 884850 1 .95 967829 4 .92 0.32371 8 54 832899 2 .97 884833 1 .95 96383 4 .92 0.32117 7 55 833305 2 .27 88483 1 .95 96383 4 .92 0.31864 6 56 833241 2 .27 88498 1 .97 963843 4 .22 0.31611 5 58 833512 2 .27 884491 1 .95 963843 4 .22 0.31104 3 58 833512 2 .25 884491 1 .95 963843 4 .22 0.31104 3 58 833512 2 .25 884491 1 .95 963843 4 .22 0.31104 3 59 833648 2 .27 864245 1 .97 963403 4 .22 0.3104 3 60 9.833783 2 .25 964245 1 .97 963403 4 .22 0.30597 1 9.864127 1 .97 963403 4 .22 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127 1 .97 963403 4 .23 0.30597 1 9.864127	49	1 .832288	2.21 9.99	.865419	1.80			.088181	11
51 9 - 8832561 2 . 27 9 . 865185 1 . 95 9 . 967376 4 . 92 10 . 032924 9 . 853263 53 . 8832633 2 . 27 . 864860 1 . 97 9 . 967883 4 . 92 . 032371 7 . 7 . 7 . 7 . 7 . 7 . 7 . 7 . 7 . 7 .	50	.832425	9.97	.865302		.967128		.032877	10
52 838997 2.37 885068 1.97 967829 4.22 09371 8 53 832832 2.27 864950 1.97 967883 4.23 032117 7 54 832969 2.27 894833 1.95 968136 4.22 031864 6 55 833105 2.27 384716 1.97 968136 4.23 031864 6 56 833941 2.27 364968 1.97 963643 4.23 031611 5 58 833512 2.25 364481 1.97 969449 4.22 031104 3 59 833648 2.27 364245 1.97 969463 4.23 03104 3 60 9.833783 2.25 964245 1.97 990403 4.23 030597 1 9.844127 1.97 990403 4.23 030597 1 10.030344 0	51	9-832561		9 SEKIRK		9.987978		10 039594	ا و ا
58 .832893 2.27 .864950 1.95 .967883 4.22 .031804 7 54 .832969 2.27 .864838 1.95 .968186 4.22 .031804 6 55 .833105 2.27 .864716 1.97 .968389 4.23 .031804 5 56 .833241 2.27 .864598 1.97 .96843 4.23 .031857 4 57 .933877 2.27 .864481 1.95 .968966 4.22 .031104 3 58 .833512 2.27 .864945 1.97 .969149 4.23 .03104 3 59 .833648 2.27 .864945 1.97 .969403 4.23 .030697 1 60 9.833783 2.25 9.864127 1.97 9.969656 4.22 10.030344 0	52		2.27						
54 .832969 2.27 .844838 1.95 .968136 4.22 .031864 6 55 .833105 2.27 .844716 1.95 .968389 4.22 .031611 5 56 .833241 2.27 .864598 1.97 .968893 4.23 .031857 4 57 .933877 2.25 .864981 1.97 .96896 4.22 .031104 3 58 .833612 2.27 .864983 1.97 .969403 4.22 .030651 3 59 .833648 2.27 .864245 1.97 .969403 4.23 .030697 1 60 9.833783 2.25 9.864127 1.97 .969666 4.22 .030697 1 10 .030344 0	53	.832833	2.27	.864950		.967888	4.25		7
55 .833105 2.27 .84716 1.97 .968389 4.23 .031611 5 56 .833241 2.27 .864598 1.97 .968643 4.23 .031611 5 57 .333877 2.27 .864481 1.95 .968964 4.23 .031104 3 58 .833512 2.27 .864363 1.97 .969149 4.22 .030651 2 59 .833648 2.25 9.864945 1.97 .969403 4.23 .030697 1 60 9.833783 2.25 9.864127 1.97 9.969656 4.22 .030697 1				.864833	1.90	.968136	4.22	.031864	6
56 .833241 2.27 .864598 1.97 .968643 4.22 .031357 4 57 .833877 2.27 .864481 1.95 .968906 4.22 .031104 3 58 .833512 2.25 .864963 1.97 .969149 4.22 .031104 3 59 .833648 2.27 .864945 1.97 .969403 4.23 .030697 1 60 9.833783 2.25 9.864127 1.97 9.969656 4.22 10.030344 0	55		2 97	.864716	1.80	.968389			5 1
58	56		2 27			.968643			4
59 .833648 2.27 .864245 1.97 .969403 4.28 .030697 1 .00061	57		2.25						3
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' Cosine, D. 1'. Sine. D. 1'. Cotang. D. 1'. Tang.	-00	Ø.003103		v.004127		y.y09000		10.080844	י
i baio, i b.i. ii comang. i b.i. i lang. i	-,	Cosine	D. 1'.	Sine.	D. 1'	Cotang	D 1'	Tang	7
		. 300000				, Journal ,	٠		

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								186
,	Sine.	D. 1*.	Cosine.	D. 1*.	Tang.	D. 1°.	Cotang.	,
0	9.833783		9.864127		9.969656		10.030344	60
ĭ	833919	2.27	.864010	1.95	.969909	4.22	.030091	59
9	.834054	2.25	863992	1.97	.970162	4.22	.029838	58
3	.834189	2.25 2.27	.863774	1.97 1.97	.970416	4.23 4.22	.029584	57
4	.834325	2.25	.863656	1.97	.970669	4.22	.029331	56
5	.834460	2.25	.863538	1.98	.970922	4.22	.029078	55
6	. 834595	2.25	.863419	1.97	.971175	4.23	.028825	54
7	. 834730	2.25	.863301	1.97	.971429	4.22	.028571	53
8 9	.834865 .834999	2.23	.863183 .863064	1.98	.971682	4.22	.028318	52
10	.835134	2.25	.862946	1.97	.971935 .972188	4.22	.028065 .027812	51 50
		2.25		1.98	11	4.22	1	1
11	9.835269	2.23	9.862827	1.97	9.972441	4.23	10.027559	49
12	.835403	2.25	.862709	1.98	.972695	4.22	.027305	48
13	.835538	2.23	.862590	1.98	.972948 .978201	4.22	.027052	47
14	.835672 .835807	2.25	.862471 .862353	1.97	.978201	4.22	.026799 .026546	46 45
15 16	.835941	2.23	.862234	1.98	.973454	4.22	.026293	44
17	.836075	2.23	.862115	1.98	.973960	4.22	.026040	43
18	.836209	2.23	.861996	1.98	.974213	4.22	.025787	42
19	.836343	2.23	.861877	1.98	.974466	4.22	.025534	41
19 20	.836477	2.23	.861758	1.98	.974720	4.23	.025280	40
	9.836611	2.23	1	2.00	H	4.22	10.025027	39
21 22 23	.836745	2.23	9.861638 .861519	1.98	9.974973	4.22	.024774	98
99	.836878	2.22	.861400	1.98	.975479	4.22	024521	88 87
24	.837012	2.23	.861280	2.00	.975732	4.22	.024268	36
25	.837146	2.23	.861161	1.98	.975985	4.22	.024015	35
26	.837279	2.22	.861041	2.00	.976238	4.22	.023762	84
26 27	.837412	2.22 2.23	.860922	1.98	.976491	4.22 4.22	.023509	33
28 I	.837546	2.22	.860802	2.00 2.00	.976744	4.22	.023256	32
29	.837679	2.22	.860682	2.00	.976997	4.22	.023003	81
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32	.838078	2.22 2.22	.860322	2.00	.977756	4.22	.022244	28
33	.888211	2.22	.860202	2.00	.978009	4.22	.021991	27
34	.838344	2.22	.860082	2.00	.978262	4.22	.021738	26
35	.838477	2.22	.859962	2.00	.978515	4.22	.021485	25
36	.838610	2.20	.859842	2.02	.978768	4.22	.021232	24
37 38	.838742 .838875	2.22	.859721 .859601	2.00	.979021 .979274	4.22	.020979	23 22
39	.839007	2.20	.859480	2.02	.979527	4.22	.020720	21
40	.839140	2.22	.859360	2.00	.979780	4.22	.020220	20
		2.20		2.0	11	4.22	1	
41	9.839272	2.20	9.859239	2.00	9.980033	4.22	10.019967	19
42 43	.839404 .839536	2.20	.859119 .858998	2.02	.980286 .980538	4.20	.019714	18
44	.839668	2.20	.858877	2.02	.980791	4.22	.019209	16
45	.839800	2.20	.858756	2.02	.981044	4.22	.018956	15
46	.839932	2.20	.858635	2.02	.981297	4.22	.018703	14
47	.840064	2.20	.858514	2.02	.981550	4.22	.018450	13
48	.840196	2.20	.858393	2.02	.981803	4.22	.018197	12
49	.840328	2.20 2.18	.858272	2.02	.982056	4.22	.017944	11
50	.840459	2.10	.858151	2.02 2.03	.982309	4.22	.017691	10
51	9.840591		9.858029		9.982562	1	10.017438	9
52	.840722	2.18	.857908	2.02	.982814	4.20	.017186	
53	.840854	2.20	.857786	2.03	.983067	4.22	.016933	8 7 6 5 4 3
54	.840985	2.18 2.18	.857665	2.02	.983320	4.22 4.22	.016680	6
55	.841116	2.18	.857543	2.03 2.02	.983573	4.22	.016427	5
56 57	.841247	2.18	.857422	2.02	.983826	4.22	.016174	4
57	.841378	2.18	.857300	2.03	.984079	4.22	.015921	3
58	.841509	2.18	.857178	2.03	.984332	4.20	.015668	2
			.857056		.984584	1 2.22	.015416	1
59	.841640	2.18		2.03		4.22		
59 60	9.841771	2.18	9.856984	2.03	9.984837	4.22	10.015163	. 0

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0	9.841771 .841902	2.18 2.18	9.856934 .856812	2.03 2.03	9.984837 .985090	4.22 4.22	10.015163 .014910	60 59
2	.842033	2.17	.856690	2.03	.985343	4.22	.014657	58 57
8	.842163	2.18	.856568	2.03	.985596	4.20	.014404	57
4	.842294	2.17	.856446	2.05	.985848	4.22	.014152	56
5	.842424	2.18	.856323	2.03	.986101	4.22	.013899	55 54
6	.842555	2.17	.856201 .856078	2.05	986354	4.22	.013646	53
8	.842815	2.17	.855956	2.03	.986860	4.22	.013393	52
9	.842946	2.18	.855833	2.05	.987112	4.20	.012888	51
10	.843076	2.17 2.17	.855711	2.03 2.05	.987365	4.22	.012635	50
11	9.843206	2.17	9.855588	2.05	9.987618	4.22	10.012382	49
12	.843336	2.17	.855465	2.05	.987871	4.20	.012129	48
18	.843466	2.15	.855342	2.05	.988123	4.22	.011877	47
14	.843595	2.17	.855219	2.05	.988376	4.22	.011624	46
15	.843725 .843855	2.17	.855096	2.05	.988629 .988882	4.22	.011371	45
16	.843984	2.15	.854978 .854850	2.03	.989134	4.20	.011118	44
17	.844114	2.17	.854727	2.05	.989387	4.22	.010613	42
19	814243	2.15	.854603	2.07	.989640	4.22	.010360	41
20	.844372	2.15 2.17	.854480	2.05	.989893	4.22	.010107	40
21	9.814502	2.15	9.854856	2.05	9.990145	4.22	10.009855	39
22	.844631	2.15	.854233	2.07	.990398	4.22	.009603	38
23	.844760	2.15	.854109	2.05	.990651	4.20	.009349	37
24	.844889 .845018	2.15	.853986 .853862	2.07	.990908	4.22	.009097	36 35
25 26	845147	2.15	.853738	2.07	.991156	4.22	.008591	34
20	845976	2.15	.853614	2.07	.991662	4.22	.008338	33
27 28	845405	2.15	.853490	2.07	.991914	4.20	.008086	32
1 23	.845533	2.13	.853366	2.07	.992167	4.22	.007833	31
80	.845662	2.15 2.13	.853242	2.07 2.07	.992420	4.22 4.20	.007580	30
81	9.845790		9.853118		9.992672		10.007328	29
82	.845919	2.15	.852994	2.07	.992925	4.22	.007075	28
83	.846047	2.13 2.13	.852869	2.08 2.07	.993178	4.22 4.22	.006822	27
84	.846175	2.15	.852745	2.08	.993431	4.20	.006569	26
85	.846304	2.13	.852620	2.07	.993683	4.22	.006317	25
86	.846432	2.13	.852496	2.08	.993936	4.22	.006064	24 23
87	.8465 6 0 .8466 8 8	2.13	.852371 .852247	2.07	.994189	4.20	.005811	22
89	.846816	2.13	852122	2.08	.994694	4.22	.005306	21
40	.846944	2.13 2.12	.851997	2.08 2.08	.994947	4.22 4.20	.005053	20
41	9.847071	2.13	9.851872	2.08	9.995199	4.22	10.004801	19
42	.847199	2.13	.851747	2.08	.995452	4.22	.004548	18
43	.847327	2.12	.851622	2.08	.995705	4.20	.004295	17
44	.847454 .847582	2.18	.851497 .851372	2.08	.995957 .996210	4.22	.004048	16 15
45	.847709	2.12	.851246	2.10	.996210	4.22	.003537	14
47	.847836	2.12	.851121	2.08	.996715	4.20	.003285	13
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49	.848091	2.12 2.12	.850870	2.10 2.08	.997221	4.22 4.20	.002779	11
50	.848218	2.12	.850745	2.10	.997473	4.22	.002527	10
51	9.848345 .848472	2.12	9.850619	2.10	9.997726	4.22	10.002274	9 8
52 53	.848472	2 12	.850493 .850368	2.08	997979	4.20	.002021	7
54	.848726	2.12	.850242	2.10	.998484	4.22	.001516	6
55	.848852	2.10	.850116	2.10	.998737	4.22	.001263	5
56	.848979	2.12	.849990	2.10	.998989	4.20 4.22	.001011	4
57	.849106	2.12 2.10	.849864	2.10 2.10	.999242	4.22	.000758	3
58	.849232	2.10	.849738	2.10 2.12	.999495	4.20	.000505	2
59 60	.849859 9.849485	2.10	.849611	2.10	.999747	4.22	.000258 10.000000	1 0
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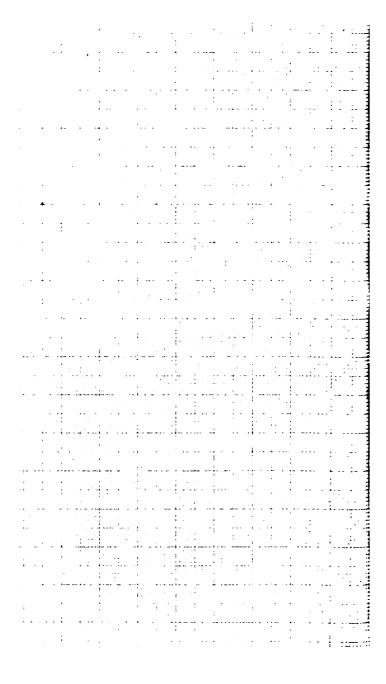
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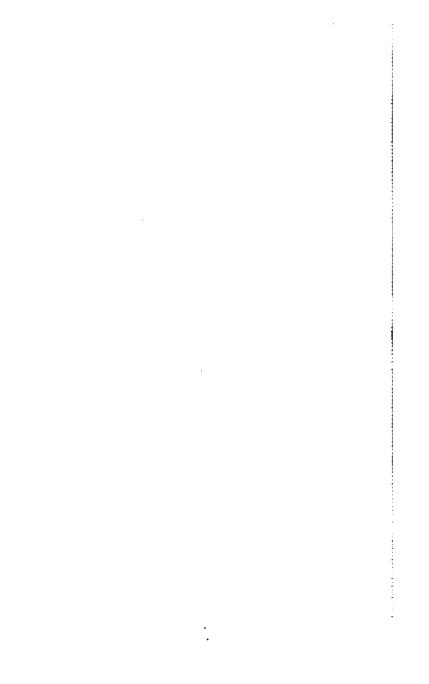
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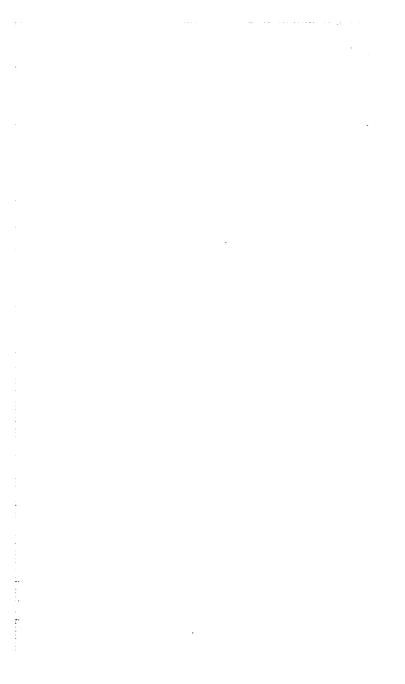




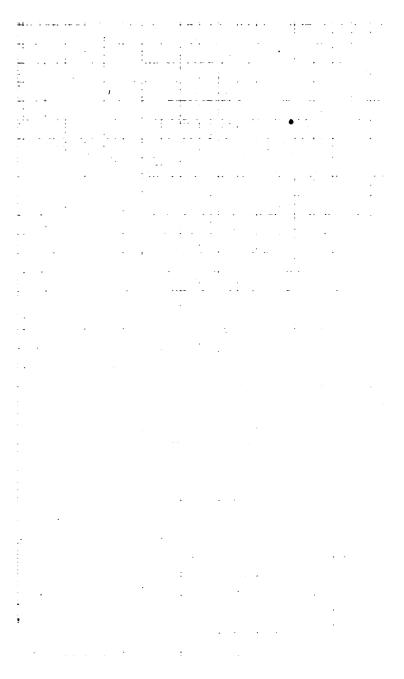
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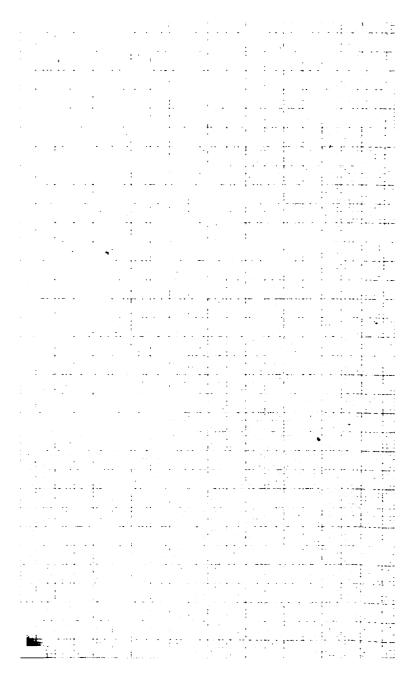
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