page					
336	$x^2 - 51y^2$		*insert* 175		
	$x^2 - 53y^2$	*for*	1 1	*read*	131
	$x^2 - 55y^2$		*insert* 67 *and* 201		
	$x^2 - 58y^2$	*for*	67	*read*	65
337	$x^2 - 74y^2$		*insert* 253		
338	$x^2 - 85y^2$	*for*	73	*read*	173
339	$x^2 - 101y^2$	*for*	378	*read*	373

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UNPUBLISHED MATHEMATICAL TABLES

Editorial Note: The UMT File [see *MTAC*, v. 4, p. 101] now contains the following manuscript table: UMT **77**[D].—E. C. Bower, *Natural Circular Functions for decimals of a circle* [*MTAC*, v. 3, p. 425]. For an unpublished table concerning elliptic integrals see RMT **787**.

95[A].—Institut für angewandte Mathematik, Eidg. Tech. Hochschule, Zürich, *Table of Binomial Coefficients.* Manuscript in the possession of the Institute.

This is a table of the exact values of the binomial coefficients, extending as far as

$$\binom{100}{50} = 10089\ 13445\ 45564\ 19333\ 48124\ 97256.$$

H. Rutishauser

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96[A].—J. W. Wrench, Jr., & L. B. Smith, *Values of the terms of the Gregory series for* arccot *5 and* arccot *239 to 1120 and 1150 decimal places, respectively.* Mss. in possession of the authors.

The table of individual terms of the Gregory series for arccot 5 gives, in the range 501D to 1150D inclusive, the first 820 terms of that series. Exclusive of zeros following terminating decimals, the total number of significant figures involved is 379,290. The companion table of terms of the series for arccot 239 consists of 1120D values of the first 235 terms. The total number of significant figures in this table is 131442.

The sums of the positive and negative terms of each series are given to the corresponding degree of approximation. From these data approximations to arccot 5 and arccot 239 have been obtained correct to 1148D and 1119D, respectively, as confirmed by the ENIAC calculation of these numbers [*MTAC*, v. 4, pp. 11–15].

For the sake of chronological accuracy it should be mentioned that the final checking of the 1120D approximation to arccot 239 was completed by Mr. Smith on 24 July 1949, and the calculation of arccot 5 had been completed by the writer the previous month except for checking the data beyond

850D. This checking had not been completed when the ENIAC computation was made in September, 1949, and subsequent comparison with these independently computed values of arccot 5 and arccot 239 revealed several discrepant figures which were found to be due entirely to seven errors of transcription of data and addition of terms in the previously unchecked portion of the calculation of arccot 5. Mr. Smith's value of arccot 239 agreed perfectly to 1119D with the more extended approximation found by the ENIAC. By 6 October 1949 all discrepancies had been removed and the derived approximation to π agreed through 1118D with the value determined by the ENIAC.

As a by-product of the extension of arccot 5 from 850D to 1150D the earlier table of 2^n, $n = 1(2)1207$ [*MTAC*, vol. 2, pp. 246, 374], has been extended to the range $n = 1(2)1667$. The same method of checking that was employed before, namely Fermat's simple theorem, was retained. In addition, the last entry in the table was multiplied by 2^{555} to obtain 2^{2222}, which had previously been computed by H. S. UHLER but not published. The two values of this power agreed perfectly.

J. W. WRENCH, JR.

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97[C].—RADIO CORPORATION OF AMERICA, *Table of Logarithms to the Base 2 for numbers* 0.000 *to* 1.000, Mimeograph MS in possession of the RCA Laboratories Division, Princeton, N. J. Copy deposited in the UMT FILE.

The function $\log_2 p$ is tabulated to 4D for

$$p = 0(.002).2(.01)1.$$

The table was prepared to facilitate studies in the theory of information-handling.

R. SERRELL

RCA Laboratories
Princeton, N. J.

98[D, H].—SIDNEY JOHNSTON. *Solutions of* $\sin x = \pm cx$. Manuscript in possession of the author, 81 Fountain St., Manchester 2, England.

This manuscript gives a solution x of $\sin x = cx$ for $c = 0(.002).78(.001)$ $.927(.0005).9665(.00025)98575,9854(.0002).9892(.0001).9951(.00005).9979$ and of $\sin x = -cx$ for $c = 0(.001).136(.0005).1815(.00025).201(.0002)$ $.2054(.0001).2122(.00005).2148(.00002).217$ and a large number of values of c in the immediate neighborhood of $c = .217$. There is also a table of solutions of $\sin x = (1 - c^2)x$ for $c = 0(.002).048$. Throughout the entire table x is given to 8D with Δ, Δ^2, Δ^3, Δ^4.

99[D, H].—SIDNEY JOHNSTON. *Solutions of* $x - \sin x = c$. Manuscript in possession of the author and NBSCL.

This gives solutions to 8D of $x - \sin x = y^3/6$ for $y = 0(.01)1.53$.

100[F].—R. C. DOUTHITT, *Tables related to Euler's totient function.* On punch cards in possession of the author, Dept. of Math., University of California, Berkeley. Tabulated manuscript in UMT FILE.

We denote as usual by $\phi(n)$ the number of numbers not exceeding n and prime to n and define

$$\begin{aligned} \Phi(n) &= \sum_{m \leq n} \phi(m) \\ A(n) &= [\tfrac{1}{2} + 3n^2\pi^{-2}] \\ B(n) &= \Phi(n) - A(n) \\ C(n) &= A(n) - \Phi(n-1). \end{aligned}$$

The table gives all five functions for $n = 1(1)10000$. The values of $\phi(n)$ were taken from GLAISHER's tables [*MTAC*, v. 1, p. 136], and the other functions were computed and checked by means of IBM 604 and 602A calculating punch machines.

The functions $B(n)$ and $C(n)$, contrary to a conjecture by J. J. SYLVESTER, are not always positive and are found to be negative or zero for a total of 20 times for $B(n)$ and 18 times for $C(n)$. [See also UMT 86[**F**], *MTAC*, v. 4, p. 29–30.]

101[F].—D. H. LEHMER, *Tables of Ramanujan's* $\tau(n)$. Tabulated manuscript and punched cards deposited in UMT FILE.

The function $\tau(n)$ is the coefficient of x^{n-1} in the expansion of the 24-th power of Euler's infinite product

$$(1 - x)(1 - x^2)(1 - x^3)\cdots.$$

The tables give $\tau(n)$ for $n = 1(1)2500$ as well as

$$\sum_{n \leq N} \tau(n), \qquad \sum_{n \leq N} |\tau(n)|, \qquad \sum_{n \leq N} \{\tau(n)\}^2$$

for $N = 10(10)2500$. There is a separate table of $\tau(p)$ for $1000 < p < 2500$ and p a prime, giving also 6D values of $|\tau(p)|p^{-11/2}$. The table was produced on an IBM 602A calculating punch.

102[L].—CAMBRIDGE UNIVERSITY MATHEMATICAL LABORATORY. *Table of* $1/\Gamma(x + iy)$. Manuscript in the possession of the Laboratory.

The table furnishes real and imaginary parts of the reciprocal of the Gamma function, $1/\Gamma(x + iy)$, to 6D for $x = -.5(.01).5$ and $y = 0(.01)1$. This table was computed and printed by the EDSAC (*MTAC*, v. 4, p. 61–65) under the direction of J. P. STANLEY and involved nearly 20 hours of machine time.

103[L].—SIDNEY JOHNSTON, *Tables of Sievert's Integral*, manuscript in possession of the author, photograph copy at NBSCL.

This is a table of the function

$$\int_0^x \exp(-A \sec t)dt$$

for $A = 0(.5)10$ and $x = 0(\pi/180)\pi/2$. Values are given mostly to 5S. Explicit tabulation is not made beyond a value of x where the integral remains unchanged to 5S.

104[V].—SIDNEY KAPLAN, *Tables of Velocity Functions Characterizing Flows Formed by Jets from Orifices*. U. S. Naval Ordnance Laboratory Memorandum, 87 p. Available only to government agencies and contractors.

The basic mathematics governing the flow of incompressible fluids has been known for many years. Because a great amount of tedious computation is necessary, flows for only a few isolated cases have been calculated in the past. At the suggestion of G. BIRKHOFF,[1] the Naval Ordnance Laboratory has calculated for the first time the flow patterns of an incompressible fluid from an orifice for four different angles of aperture: $\alpha = 0°, 15°, 45°$, and $90°$. In all, more than 2,000 points were calculated.

The governing equations are

$$W = U + iV = \ln(\zeta) - \ln(\zeta^2 - 2C\zeta + 1) \tag{1}$$

$$Z = x + iy = z' + iSz'' \tag{2}$$

$$\zeta = \xi + i\eta, \qquad |\zeta| \leqslant 1, \qquad 0 \leqslant \arg\zeta \leqslant \pi \tag{3}$$

$$Z' = -\zeta^{-1} + C(W + \ln\zeta) \tag{4}$$

$$Z'' = \ln\left[\frac{\zeta - \exp(i\alpha)}{\zeta - \exp(-i\alpha)}\right], \qquad \alpha < \arg Z'' \leqslant \pi + \alpha \tag{5}$$

where $S = \sin\alpha$, $C = \cos\alpha$, and values for α, U, V are as follows.

α	Range in U	Range in V	Number of Cases
0	$-2.8(.2)2$	$0(\pi/20)\pi$	525
$\pi/12$	$-2.4(.2)3.2$	$0(\pi/20)\pi$	609
$\pi/4$	$-2.4(.2)1.6$	$0(\pi/20)\pi$	441
$\pi/2$	$-2.4(.1)1.6$	$0(\pi/20)\pi/2$	451

x and y are given to 4D and ξ and η are given to 5D. In each case the error is less than a half a unit in last place.

[1] G. BIRKHOFF, & E. ZARANTANELLO, *Jets, Wakes and Cavities*, soon to be published.

AUTOMATIC COMPUTING MACHINERY

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