

# Mathematical Tables *and other* Aids to Computation

---

A Quarterly Journal

Edited by

E. W. CANNON

F. J. MURRAY

C. C. CRAIG

J. TODD

A. ERDÉLYI

D. H. LEHMER, *Chairman*

---

IV

NOS. 29-32

1950

*Published by*

THE NATIONAL RESEARCH COUNCIL

Washington, D. C.

NATIONAL RESEARCH COUNCIL  
DIVISION OF MATHEMATICAL AND PHYSICAL SCIENCES

EDITORIAL COMMITTEE

- E. W. CANNON (E.W.C.), National Bureau of Standards, Washington, D. C. Automatic Computing Machinery [ACM].
- C. C. CRAIG (C.C.C.), University of Michigan, Ann Arbor, Mich. Mathematical Statistics [K].
- A. ERDÉLYI (A.E.), California Institute of Technology, Pasadena, Calif. Higher Mathematical Functions [L].
- F. J. MURRAY (F.J.M.), Columbia University, New York, N. Y. Other Aids to Computation [OAC].
- J. TODD (J.T.), National Bureau of Standards, Washington, D. C. Numerical Methods.
- D. H. LEHMER (D.H.L.), *Chairman*, University of California, Berkeley, Calif.

---

SUBSCRIPTION RATES

1943-1945: (Nos. 1-12) \$12.00 for all 12 issues (not available for separate sale except as noted below\*)

1946-1949: \$4.00 per year

1950: \$5.00 per year

Single issues are available for sale as follows:

\* 1944 (No. 7, "A Guide to Tables of Bessel Functions," by H. Bateman and R. C. Archibald, 104 pp.) \$2.00

1946-1949 (Nos. 13-28) \$1.25 for single issue

1950 (Nos. 29-32) \$1.50 for single issue

All payments are to be made to National Academy of Sciences, 2101 Constitution Avenue, Washington, D. C.

Agents for Great Britain and Ireland (subscription 42s, 6d for 1950) Scientific Computing Service, Ltd., 23 Bedford Square, London W.C.1.

---

---

Published quarterly in January, April, July and October by the National Research Council, Prince and Lemon Sts., Lancaster, Pa., and Washington, D. C.

All contributions intended for publication in *Mathematical Tables and Other Aids to Computation*, and all Books for review, should be addressed to Professor D. H. Lehmer, 942 Hilldale Ave., Berkeley, Calif.

Entered as second-class matter July 29, 1943, at the post office at Lancaster, Pennsylvania, under the Act of August 24, 1912.

# Mathematical Tables *and other* Aids to Computation

---

A Quarterly Journal

Edited by

E. W. CANNON

F. J. MURRAY

C. C. CRAIG

J. TODD

A. ERDÉLYI

D. H. LEHMER, *Chairman*

---

IV

NOS. 29-32

1950

*Published by*

THE NATIONAL RESEARCH COUNCIL

Washington, D. C.

# CONTENTS

IV NUMBER 29 JANUARY 1950

Note of Appreciation . . . . .	R. C. GIBBS	1
Raymond Clare Archibald . . . . .	A. A. BENNETT	1
Checking by Differences—I . . . . .	J. C. P. MILLER	3
An ENIAC Determination of $\pi$ and $e$ to more than 2000 Decimal Places G. W. REITWIESNER		11
Recent Mathematical Tables . . . . .		15
<p style="margin-left: 2em;">691 (Lotkin), 692 (Uhler), 693 (Mather), 694 (Smith), 695 (Atkinson &amp; Cherwell), 696 (Lehner), 697 (Prasad), 698 (Robert), 699 (Varnavides), 700 (Wijdenes), 701 (Yarden), 702 (Makar), 703 (Riordan), 704 (Greenwood &amp; Danford), 705 (Salzer), 706 (Chandrasekhar), 707 (Godwin), 708 (Grubbs), 709 (Gumbel), 710 (Angot), 711 (Harvard Univ.), 712 (Laurent), 713 (MacDonald), 714 (Mursi), 715 (Oberhettinger &amp; Magnus), 716 (Peremans &amp; Kemperman), 717 (Rankin), 718 (Wiener), 719 (Krat &amp; Petrov), 720 (Reicheneder), 721 (Fox), 722 (Griffing &amp; Fox)</p>		
Mathematical Tables—Errata . . . . .		27
<p style="margin-left: 2em;">162 (Fisher &amp; Yates), 163 (FMR Index), 164 (Lehmer) 165 (NBSMTP), 166 (Tani), 167 (Travers)</p>		
Unpublished Mathematical Tables . . . . .		29
<p style="margin-left: 2em;">84 (Reitwiesner), 85 (Jarden &amp; Katz), 86 (Whitten), 87 (Salzer), 88 (Birge), 89 (Hammer)</p>		
Automatic Computing Machinery . . . . .		31
<p style="margin-left: 2em;">Technical Developments (Magnetic Drum Storage for Digital Information Processing Systems)</p> <p style="margin-left: 2em;">Discussions (Notes on Modern Numerical Analysis—I)</p> <p style="margin-left: 2em;">Bibliography Z–X (1–3. Anon., 4. Booth, 5. Deeley &amp; MacKay, 6. Goldstine &amp; von Neumann, 7. Harvard Univ., 8. Hegbar, 9. Metz &amp; Andersen, 10. Page, 11. Ridenour, 12. Sharpless, 13. Wiener). News</p>		
Other Aids to Computation . . . . .		53
<p style="margin-left: 2em;">Addition and Subtraction on a Logarithmic Slide Rule. Bibliography Z–X (14. Chebyshev, 15. Michel, 16. Murray, 17. Orcutt)</p>		
Notes . . . . .		54
<p style="margin-left: 2em;">110. New Factorizations of <math>2^n \pm 1</math>; 111. Electronic Computers and the Analysis of Stochastic Processes</p>		
Query . . . . .		57
<p style="margin-left: 2em;">33. Lenhart Tables</p>		
Queries—Replies . . . . .		58
<p style="margin-left: 2em;">43. Integral Evaluations</p>		
Corrigenda . . . . .		59

## CONTENTS

IV NUMBER 30 APRIL 1950

The EDSAC (Electronic Delay Storage Automatic Calculator) . . . . .	61
W. RENWICK, M. V. WILKES	
Convergence Rates of Iterative Treatments of Partial Differential Equations . . . . .	65
S. P. FRANKEL	
On a Definite Integral . . . . .	75
R. H. RITCHIE	
Recent Mathematical Tables . . . . .	77
723 (Davis & Fisher), 724 (Emde), 725 (Bremmer), 726 (Harvard Univ.), 727 (Gaunin, Houdaille & Bernard), 728 (Chatland), 729 (Chowla & Todd), 730 (Gambelli), 731 (Gupta), 732 (Petrovich), 733 (Tietze), 734 (Todd), 735 (Sade), 736 (Greenwood), 737 (Salzer & Zucker), 738 (Godwin), 739 (Gumbel), 740 (Hastings, Mosteller, Tuckey & Winsor), 741 (Johnson), 742 (Patnaik), 743 (Abbott), 744 (Abramowitz), 745 (Darwin), 746 (Godfrey), 747 (Goodwin & Staton), 748 (Hartree), 749 (Harvard Univ.), 750 (Harvard Univ.), 751 (Jones), 752 (Nockere), 753 (Pachner), 754 (Papas & King), 755 (Rothman), 756 (Solodovnikov), 757 (Ulrich), 758 (Ward), 759 (Kopal), 760 (Thomas)	
Mathematical Tables—Errata . . . . .	99
168 (Carey), 169 (NBSMTP), 170 (NBSMTP), 171 (Schwarz), 172 (Watson)	
Unpublished Mathematical Tables . . . . .	101
90 (Lienard), 91 (Ballistic Research Lab.), 92 (Ballistic Research Lab.), 93 (Fukamiya), 94 (Ballistic Research Lab.)	
Automatic Computing Machinery . . . . .	103
Technical Developments (Characteristics of the Institute for Numerical Analysis Computer)	
Discussions (Statistical Treatment of Values of First 2000 Decimal Digits of $e$ and of $\pi$ Calculated on the ENIAC)	
Notes on Numerical Analysis—2 (Note on the Condition of Matrices)	
Bibliography Z—XI (1. Andrews, 2. Ashby, 3. Auerbach, Eckert, Shaw & Sheppard, 4. Barney, 5. Bliss, 6. Hartree, 7. Huskey, 8. Kilburn, 9. McCulloch, 10. Parsons, 11. Pearcey, 12. Shimizu & Katayama, 13–15. Wilkes, 16. Williams)	
News	
Other Aids to Computation . . . . .	118
Bibliography Z—XI (17. Carter & Sadler, 18. Cook & Maginniss, 19. Macnee, 20. Jaeger & Clarke, 21. Perek, 22. Walker)	
Notes . . . . .	121
112. A Committee on Factor Tables, 113. Supersonic Flow Calculations, 114. NBSCL Tables, 115. On Large Primes and Factorizations	
Query . . . . .	125
34. Archimedes Cattle Problem	
Queries—Replies . . . . .	125
44. Tables of $\sin nx/\sin x$	
Corrigenda . . . . .	125

# CONTENTS

IV NUMBER 31 JULY 1950

Matrix Inversion by a Monte Carlo Method . . . . .	127
G. E. FORSYTHE & R. A. LEIBLER	
Maximum-Interval Tables . . . . .	129
D. H. SADLER	
Planning and Error Considerations for the Numerical Solution of a System of Differential Equations on a Sequence Calculator . . . . .	133
F. J. MURRAY	
Recent Mathematical Tables . . . . .	144
761 (Coustal), 762 (Uhler), 763 (Davies), 764 (Matsumoto), 765 (Hopkins), 766 (Jarden & Katz), 767 (Katz), 768 (Palamà), 769 (David & Kendall), 770 (Todd), 771 (Reiz), 772 (Salzer), 773 (Greb & Berrettoni), 774 (Finney), 775 (Johnson), 776 (Nair), 777 (Olds), 778 (Swineford), 779 (Walsh), 780 (Walsh), 781 (Walsh), 782 (Chandrasekhar), 783 (Howarth), 784 (Krogdahl), 785 (Merbt), 786 (Olver), 787 (Riegels), 788 (Schweikert), 789 (Taylor), 790 (Wijngaarden & Scheen), 791 (Zagrebin), 792 (Spencer, Austin, Chisholm, Fine & Schwartz), 793 (Hugon)	
Mathematical Tables—Errata . . . . .	158
173 (Chebyshev)	
Unpublished Mathematical Tables . . . . .	160
95 (Institut für Angewandte Mathematik), 96 (Wrench & Smith), 97 (Radio Corporation of America), 98 (Johnston), 99 (Johnston), 100 (Douthitt), 101 (Lehmer), 102 (Cambridge Univ. Math. Lab.), 103 (Johnston), 104 (Kaplan)	
Automatic Computing Machinery . . . . .	163
Technical Developments (The Incorporation of Subroutines into a Complete Problem on the NBS Eastern Automatic Computer)	
Discussions (A note on "Is" and "Might Be" in Computers)	
Bibliography Z–XII (1. Andrews & Bode, 2. Anon., 3. Anon., 4. Anon., 5. McCulloch & Pfeiffer, 6. McSkimin, 7. Richtmyer & Metropolis, 8. Smith & Smith)	
News	
Other Aids to Computation . . . . .	175
Bibliography Z–XII, 9. Adams & Evans, 10. Bronzo & Cohen, 11. Felker, 12. Hubbard, 13. Lyman & Marchetti, 14. Makowski, 15. Meyerott & Breit, 16. Smith.	
Notes . . . . .	177
116. On Finding the Square Root of a Complex Number, 117. Table for Solving Cubic Equations, 118. Note on the paper "On a definite integral," by R. H. Ritchie, 119. Harry Bateman Bibliography	
Query . . . . .	180
35. W. Thiele's Table	
Queries—Replies . . . . .	180
45. The Integral $\int_0^\infty e^{-A \sec \theta} d\theta$ , 46. Pitiscus Tables	
Corrigenda . . . . .	180

CONTENTS

IV NUMBER 32 OCTOBER 1950

On a Special Case of a Quadrature Formula of Christoffel . . . A. REIZ	181
New Information Concerning Isaac Wolfram's Life and Calculations . . . R. C. ARCHIBALD	185
Recent Mathematical Tables . . . . .	200
794 (Salzer), 795 (Uhler), 796 (Opler), 797 (Segerdahl), 798 (Cassels), 799 (Lehner), 800 (Uhler), 801 (Lévy), 802 (Anscombe), 803 (Aspin), 804 (Bose), 805 (Finney), 806 (Fix), 807 (Gayen), 808 (Howell), 809 (NBS), 810 (Rao), 811 (Thomas), 812 (Whitfield), 813 (Wishart), 814 (Wold), 815 (Curtis), 816 (Feister), 817 (Dingle), 818 (Forsythe), 819 (Frank), 820 (Hodapp), 821 (Kotani & Takahashi), 822 (Low), 823 (Scorer), 824 (Sauvenier-Goffin), 825 (Strayhorne), 826 (Tournier & Bassière), 827 (Vedeler), 828 (Tri- comi), 829 (Wei), 830 (Stone), 831 (Lieuwen), 832 (BRL), 833 (van Wijngaarden)	
Mathematical Tables—Errata . . . . .	222
174 (Anderson & Houseman), 175 (Comrie), 176 (Dickson), 177 (Gauss), 178 Kraitchik	
Unpublished Mathematical Tables . . . . .	223
105 (Opler), 106 (Anema), 107 (Anema & Miksa), 108 (Gloden), 109 (Brown & Dempsey)	
Automatic Computing Machinery . . . . .	225
Technical Developments (Report on the Machine of the Institut Blaise Pascal; The Operating Characteristics of the SEAC) Discussions (Binary-Decimal Conversion on a Desk Calculator) Bibliography Z-XIII (1. Barrois & Basile, 2. Berkeley, 3. Chen, 4. Eckert, Lukoff & Smoliar, 5. Floyd, 6. Office of Naval Research, 7. Ridenour, 8. Shannon) News	
Other Aids to Computation . . . . .	239
Bibliography Z-XIII (9. Adams, 10. Billing, 11. Brown & Mc- Kinney, 12. Brown & Sharp), 13. Lehman, 14. Levens, 15. Linton, 16. McCool, 17. Meyer zur Capellen, 18. Sauer, 19. Spangenberg, Walters & Schott, 20. Walther, 21. Walz, 22. Wittke, 23. Zuse	
Notes . . . . .	244
120. Tests of Random Digits	
Queries and Queries—Replies . . . . .	246
Corrigenda . . . . .	246
Indices . . . . .	247

## CLASSIFICATION OF TABLES

- A. Arithmetical Tables. Mathematical Constants
- B. Powers
- C. Logarithms
- D. Circular Functions
- E. Hyperbolic and Exponential Functions
- F. Theory of Numbers
- G. Higher Algebra
- H. Numerical Solution of Equations
- J. Summation of Series
- I. Finite Differences. Interpolation
- K. Statistics
- L. Higher Mathematical Functions
- M. Integrals
- N. Interest and Investment
- O. Actuarial Science
- P. Engineering
- Q. Astronomy
- R. Geodesy
- S. Physics, Geophysics, Crystallography
- T. Chemistry
- U. Navigation
- V. Aerodynamics, Hydrodynamics, Ballistics
- Z. Calculating Machines and Mechanical Computation