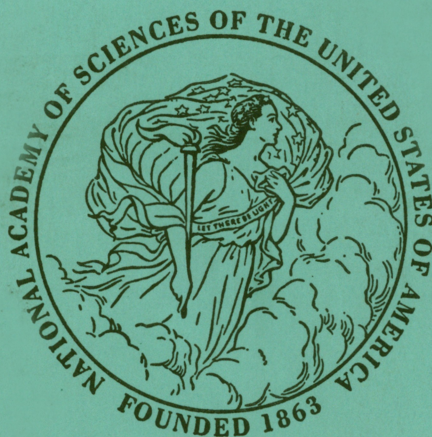


Volume XI

1957

Nos. 57-60

Mathematical Tables
and other
Aids to Computation



Published Quarterly

by the

National Academy of Sciences—National Research Council

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

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

Editorial Committee
Division of Mathematics
National Academy of Sciences—National Research Council
Washington, D. C.

C. B. TOMPKINS, *Chairman*, University of California, Los Angeles, California

J. H. BIGELOW, The Institute for Advanced Study, Princeton, New Jersey

C. C. CRAIG, University of Michigan, Ann Arbor, Michigan

ALAN FLETCHER, University of Liverpool, Liverpool 3, England

EUGENE ISAACSON, Institute of Mathematical Sciences, New York University,
New York 3, New York

C. V. L. SMITH, Ballistic Research Labs., Aberdeen Proving Ground, Aberdeen,
Maryland

A. H. TAUB, University of Illinois, Urbana, Illinois

HENRY WALLMAN, Institutionen för Teleteknik I, Chalmers Tekniska Hogskola,
Gibraltargatan 5P, Göteborg S, Sweden

* * *

Information to Subscribers

The journal is published quarterly in one volume per year with issues numbered serially since Volume I, Number 1. Subscriptions are \$5.00 per year, single copies \$1.50. Back issues are available as follows:

Volume I (1943–1945), Nos. 10 and 12 *only* are available; \$1.00 per issue.

Volume II (1946–1947), Nos. 13, 14, 17, 18, 19, and 20 *only* are available;
\$1.00 per issue

Volume III (1948–1949), Nos. 21–28 available; \$4.00 per year (four issues),
\$1.25 per issue

Volume IV (1950 and following), all issues available; \$5.00 per year, \$1.50
per issue

All payments are to be made to the National Academy of Sciences and forwarded to the Publications Office, 2101 Constitution Avenue, Washington, D. C. Agents for Great Britain and Ireland: Scientific Computing Service, Ltd., 23 Bedford Square, London W.C.1

* * *

Microcard Edition

Volumes I–X (1943–1956), Nos. 1–56 are now available on Microcards and may be purchased from The Microcard Foundation, Box 2145, Madison 5, Wisconsin, at a cost of \$20.00 for the complete set. Future volumes will be available on Microcards in the year following original publication.

* * *

Information to Contributors

All contributions intended for publication in *Mathematical Tables and Other Aids to Computation* and all books for review should be addressed to C. B. Tompkins, Department of Mathematics, University of California, Los Angeles 24, California. The author should mention the name of an appropriate editor for his paper if this is convenient.

Mathematical Tables *and other* Aids to Computation

A Quarterly Journal

Edited by

J. H. BIGELOW

C. V. L. SMITH

C. C. CRAIG

A. H. TAUB

ALAN FLETCHER

HENRY WALLMAN

EUGENE ISAACSON

C. B. TOMPKINS, *Chairman*

XI

nos. 57-60

1957

Published by

THE NATIONAL RESEARCH COUNCIL

Washington, D. C.

CONTENTS

JANUARY 1957

Numerical Integration Constants.....	HERBERT FISHMAN	1
Table of the Exponential Integral $Ei(x)$	FRANK E. HARRIS	9
On the Computation of $\log Z$ and $\arctan Z$	YUDELL L. LUKE	16
TECHNICAL NOTES AND SHORT PAPERS.....		19
Note upon the Numerical Evaluation of Limits of Sequences.....		
.....	LL. G. CHAMBERS	19
Factors of Fermat Numbers.....	RAPHAEL M. ROBINSON	21
REVIEWS AND DESCRIPTIONS OF TABLES AND BOOKS.....		22
UHLER 1, NICHOLSON & JEENEL 2, NEVILLE 3, MAEHLI 4, HORGAN 5, CHISNALL 6, HAMMER, MARLOWE & STROUD 7, KUNZ 8, SALZER 9, HORGAN 10, HARVARD UNIV. 11, FIELLER, LEWIS & PEARSON 12, HANNAN 13, NOETHER 14, BANERJEE 15, FRASER & GUTTMAN 16, GREEN- WOOD & DURAND 17, IHM 18, LORD 19, MASUYAMA 20, SAMPFORD 21, HODGES 22, MILLER 23, TOPP & LEONE 24, MORIGUTI 25, URA 26, TAKASHIMA 27, SCOTT & SMALL 28, PAGE 29, STORER & DAVISON 30, LIEBERMAN & SOLOMON 31, DODGE 32, NBS AMS 33, JOHNSTON 34, FRÖBERG 35, ALLEN 36, MACDONALD & TOWLE 37, SPARKS, PROSEN, KRUSE, & TRUEBLOOD 38, NORTON & OPLER 39, DREW & HOOPES 40, WILKES 41, NBS AMS 42, MEYER 43, NUM. ANAL. PROC. OF SIXTH SYMP. IN APP. MATH. 44, JOHNSON 45, HOUSEHOLDER 46, FORSYTHE 47, RICHARDS 48.		
TABLE ERRATA.....		51
NOTES.....		51
Societa Italiana per il progresso delle scienze.....		51
Sir Edmund Whittaker 1873-1956.....		53
CORRIGENDA.....		54

CONTENTS

APRIL 1957

Inversion of Symmetric Coefficient Matrix of Positive-Definite Quadratic form.....	55
..... THOMAS C. DOYLE	
Numerical Evaluation of Multiple Integrals I. . PRESTON C. HAMMER & A. WAYNE WYMORE	59
Solution of Poisson's Equation by Relaxation Method—Normal Gradient Specified on Curved Boundaries.....	67
..... R. V. VISWANATHAN	
TECHNICAL NOTES AND SHORT PAPERS.....	79
Table Pertaining to Solutions of a Hill Equation.....	79
..... G. BELFORD, L. JACKSON LASLETT, & J. N. SNYDER	
Rational Formulae for the Production of a Spherically Symmetric Probability Distribution.....	81
..... J. M. COOK	
On the Numerical Solution of Integral Equations.....	82
..... I. J. GOOD	
A Rotation Method for Computing Canonical Correlations.....	83
..... M. J. R. HEALY	
Polynomial Approximations to Bessel Functions of Order Zero and One to Related Functions.....	86
..... A. J. M. HITCHCOCK	
An Iterative Method for the Solution of Linear Equations Based on the Power Method for Proper Vectors.....	88
..... N. S. MENDELSON	
The Computation of Complex Proper Values and Vectors of a Real Matrix with Application to Polynomials.....	91
..... N. S. MENDELSON	
A Method of Inverting Large Matrices of Special Form.....	94
..... H. I. MEYER & B. J. HOLLINGSWORTH	
Note on the General Solution of the Confluent Hypergeometric Equation.....	97
..... J. C. P. MILLER	
Approximation and Table of the Weierstrass \wp Function in the Equianharmonic Case for Real Argument.....	99
..... THOMAS H. SOUTHARD	
A Lemma for Automatic Optimum Programming on the IBM 650. . HARVEY M. WAGNER	101
REVIEWS AND DESCRIPTIONS OF TABLES AND BOOKS.....	104
LEBEDEV & FEDOROVA 49, LEHMER 50, GODWIN 51, LEHMER 52, WILSON 53, NBS AMS 54, SALZER 55, EMERSLEBEN 56, SOUTHARD 57, HOLLANDER & TOMPKINS 58, BELFORD, LASLETT, & SNYDER 59, DE HAAN 60, GLOWATZKI 61, SASAKI 62, LANING & BATTIN 63, WOLFSON & GELLMAN 64, EMERSLEBEN 65, 66, ERDÉLYI, MAGNUS, OBERHETTINGER, & TRICOMI 67, NBS AMS 68, BENNETT, MILNE, & BATEMAN 69, COUFFIGNAL 70, CRANK 71, VAN LAETHEM 72, PROC. INST. ELEC. ENG. 73, LEBEDEV 74.	
TABLE ERRATA.....	125
A. A. ABRAMOV 252, AKADEMIĀ NAUK SSSR 253, 254, ISABELLE ARSHAM 255.	
NOTES.....	127
John von Neumann.....	127
NBS-NSF Training Program.....	129
Wayne State University.....	129
CORRIGENDA.....	129
HARVARD UNIVERSITY.....	129

CONTENTS

JULY 1957

On the Numerical Solution of Sturm-Liouville Differential Equations.	
. C. C. FARRINGTON, R. T. GREGORY, & A. H. TAUB	131
On the Numerical Evaluation of the Stokes' Stream Function.	
. DONALD GREENSPAN	150
Tables of Values of 16 Integrals of Algebraic-Hyperbolic Type.	
. CHIH-BING LING	160
Tables for the Rapid and Accurate Numerical Evaluation of Certain Infinite Integrals Involving Bessel Functions	
. I. M. LONGMAN	166
On the Time-Step to be Used for the Computation of Orbits by Numerical Integration.	
. J. W. SHELDON, B. ZONDEK, & M. FRIEDMAN	181
Optimum Quadrature Formulas in s Dimensions.	
. HENRY C. THACHER, JR.	189
TECHNICAL NOTES AND SHORT PAPERS.	195
A Method to Investigate Primality.	
. E. W. DIJKSTRA	195
Equally-Weighted Quadrature Formulas for Inversion Integrals.	
. HERBERT E. SALZER	197
An Open Formula for the Numerical Integration of First Order Differential Equations.	
. HERBERT S. WILF	201
Note on "A Method for Computing Certain Inverse Functions"	
. M. V. WILKES & D. J. WHEELER	204
REVIEWS AND DESCRIPTIONS OF TABLES AND BOOKS.	204
SCHMIDT 75, TRIEBEL 76, NAGLER 77, BELEVITCH & STORRER 78, KHRENOV 79, RYBNER 80, POWLEY 81, FRÖBERG 82, van WIJNGAARDEN 83, DAVIS & RABINOWITZ 84, KARPOV 85, BELL AIRCRAFT CORP. 86, PEARCEY 87, FERENTZ & HARRISON 88, BISHOP & JOHNSON 89, ANDERSON 90, SPEER PRODUCTS Co. 91, POWLEY 92, VAJDA 93, <i>Proc. Second Annual Computer App. Symp.</i> 94, SMITH 95, DOWGIRD 96, JEFFREYS & SWIRLES 97, HILDEBRAND 98, CRANDALL 99, STIBITZ & LARRIVEE 100, ECKERT & JONES 101, LEHMER 102, PEASE 103, BROMBACHER, SMITH, & VAN der PYL 104, NPL 105.	
TABLE ERRATA.	226
SPENCELEY, SPENCELEY, & EPPERSON 256.	
NOTES.	226
Handbook of Mathematical Tables—National Bureau of Standards. . .	226
International Congress of Mathematicians—August 14–21, 1958.	227
N.P.L. Mathematical Table Series.	228
CORRIGENDA.	228

CONTENTS

OCTOBER 1957

A Method for Integrating a Set of Ordinary Differential Equations Subject to a Type of Numerical Indeterminacy.....	EDWIN S. CAMPBELL	229
A Smoothest Curve Approximation.....	JOHN C. HOLLADAY	233
Numerical Integration over the Spherical Shell.....	WILLIAM H. PEIRCE	244
On a Generalization of the Prime Pair Problem.....	HERSCHEL F. SMITH	249
Generation of Bessel Functions on High Speed Computers IRENE A. STEGUN & MILTON ABRAMOWITZ		255
Remarks on the Disposition of Points in Numerical Integration Formulas..	A. H. STROUD	257
TECHNICAL NOTES AND SHORT PAPERS.....		261
A Method for the Numerical Evaluation of Certain Infinite Integrals..	BRUNO A. BOLEY	261
A Formula for the Approximation of Definite Integrals of the Normal Distribution Function.....	ROGER G. HART	265
Some Factorizations of Numbers of the Form $2^* \pm 1$	RAPHAEL M. ROBINSON	265
On the Solution of "Jury" Problems with many Degrees of Freedom...F. J. WARNER		268
REVIEWS AND DESCRIPTIONS OF TABLES AND BOOKS.....		272
GARCIA 106, LEHMER 107, LEHMER 108, GLODEN 109, LEECH 110, ROBINSON 111, LEHMER 112, PORTER 113, LEHMER 114, BELOUSOV 115, CLARK & CHURCHILL 116, CROWDER & FRANCIS 117, HARRIS 118, DINGLE, ARNDT, & ROY 119, DANK & BARBER 120, OBERHETTINGER 121, LINDMAN 122, PODE and PODE & ROSENTHAL 123, BECKENBACH 124, RAHMAN 125, CASE, DE HOFFMAN, & PLACZEK 126, FERENTZ & ROSENZWEIG 127, RAHMAN 128, PETERSSEN 129, HARRIS & PATTERSON 130, LANCZOS 131, RUTISHAUSER 132, TEMPLE & BICKLEY 133, GREENSTADT 134, BODEWIG 135, FISHMAN 136, WEYL 137, ARONSON 138, <i>Proc. of Symposium (Franklin Inst.)</i> 139, McCracken 140, SLUCKIN 141, <i>Elektronische Rechenmaschinen und Informationsverarbeitung</i> 142		
TABLE ERRATA.....		308
C. A. COULSON & W. E. DUNCANSON 257, CARL-ERIK FRÖBERG 258		
NOTES.....		309
Acknowledgments to Referres.....		309
The Illinois Journal of Mathematics.....		309
Policy Committee for Math. Tech. Advisory Committee to NBS.....		310
Index.....		313
CORRIGENDA.....		314
INDICES TO VOLUME XI.....		315
Author Index, Papers and Technical Notes.....		315
Reviews by Author of Work Reviewed.....		316
Reviews by Review Number.....		318
Reviews by Subject.....		320
Works on Numerical Analysis.....		320
Tables from Number Theory.....		325
Tables from Algebra.....		326
Tables from Analysis.....		327
Tables from Statistics.....		332
Tables from Physical Sciences.....		335
Works Concerning Social Sciences.....		337
Automatic Computation.....		337
Table Errata.....		340
Notes.....		340
Corrigenda.....		340

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
- I. Finite Differences. Interpolation
- J. Summation of Series
- 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
- W. Economics and Social Sciences
- X. Numerical Analysis and Applied Mathematics
- Z. Calculating Machines and Mechanical Computation

