201.—K. L. Nielsen & L. Goldstein, "An algorithm for least squares," *Jn. Math. Phys.*, v. 26, 1947, p. 120–132.

P. 123, $m = 35$ *for* $A_{55} =$ 488447.843200 *read* 488447.843265
P. 124, $m = 85$ *for* $A_{55} =$ 102214274.780204 *read* 102214274.782041
P. 124, $m = 90$ *for* $A_{55} =$ 144092594.780204 *read* 144092594.782041

P. G. Guest

Univ. of Sydney
Sydney, Australia

202.—I. M. Vinogradov & N. G. Chetaev, *Tablit͡sy Znacheniĭ Funkt͡siĭ Besseli͡a ot mnimogo Argumenta.* Moscow, Leningrad, 1950.

On pages III, V, 203–403, and on the spine, there are 408 errors in statements as to functions tabulated, namely: $J_{\frac{1}{3}}(ix)$ and $J_{-\frac{1}{3}}(ix)$. The correct functions are $i^{-\frac{1}{3}}J_{\frac{1}{3}}(ix) = I_{\frac{1}{3}}(x)$ and $i^{\frac{1}{3}}J_{-\frac{1}{3}}(ix) = I_{-\frac{1}{3}}(x)$.

R. C. Archibald

Brown University
Providence, R. I.

UNPUBLISHED MATHEMATICAL TABLES

136[F].—A. Ferrier. *Factorization of* $n! \pm \alpha$. Photocopy of 4 manuscript pages. Deposited in the UMT File.

Two pages of tables give the complete decomposition of $n! \pm \alpha$ for $n = 7(1)15$, $\alpha = 2(1)20$ together with 13 other miscellaneous examples.

A. Ferrier

Collège de Cusset
Allier, France

137[F].—A. Ferrier. *Table of Factors of* $2^n - 1$. Photocopy of 5 manuscript pages. Deposited in the UMT File.

Two pages of tables give the latest information on the factors of $2^n - 1$, $n = 3(2)499$.

A. Ferrier

Collège de Cusset
Allier, France

138[F].—R. F. Johnson. *Tables of Products of Powers of Small Primes.* Tabulated from punched cards. Deposited in the UMT File.

There are two tables of

$$N = 2^\alpha 3^\beta 5^\gamma 7^\delta$$

for $\alpha = 0(1)11$; $\beta = 0(1)8$; $\gamma = 0(1)5$; $\delta = 0(1)4$. The first table is arranged lexicographically by α, β, γ, δ. The second is arranged in increasing order of N. Each table contains 3240 values of N range between 1 and 100818950400000. The table is intended to facilitate the design of gear trains.

R. F. Johnson

Northrop Aircraft, Inc.
Harthorne, California

139[F].—L. POLETTI. *List of Primes of the 16th Million.* 8 pages typewritten manuscript. Deposited in the UMT FILE.

This list of primes ranges between 14984987 and 15105063 and contains 7277 primes.

140[I, K].—P. G. GUEST. *Tables of Certain Functions Occurring in the Fitting of Polynomials to Equally-Spaced Observations.* Mimeographed Manuscript, 12 p. Deposited in the UMT FILE.

Table 1 gives the coefficients β_{jk} in

$$\xi_j(x) = \sum_{k=0}^{j} \beta_{jk} x^k,$$

where $\xi_j(x)$ is the usual orthogonal polynomial[1] normalized so that $\beta_{kk} = 1$.

Table 2 gives the coefficients λ_{jk} proportional to β_{jk} such that

$$\sum_{k=0}^{j} \lambda_{jk} x^k$$

takes on the least possible integer values when x ranges over the points of observations. These latter are n equally-spaced points a unit distance apart having the origin as center. In both tables $n = 6(1)104$. In Table 1 $k \leq 4$ and in Table 2 $k \leq 5$. In Table 1 the sums S_{jj} of the squares of the values of ξ_j at the points of observation are given. Exact values are given in every case.

P. G. GUEST

University of Sydney
Sydney, Australia

[1] Compare the table of ANDERSON & HOUSEMAN [*MTAC*, v. 1, p. 148–150].

141[L].—S. R. BRINKLEY, JR., H. E. EDWARDS, & R. W. SMITH, JR., *Table of the Temperature Distribuiton Function for Heat Exchange Between a Fluid and a Porous Solid.* 141 leaves. Ms. in possession of authors, U. S. Bureau of Mines, Pittsburgh, Pa.

The function,

$$\phi_0(x,y) = e^x \int_0^x dt\, e^{-t} I_0(2\sqrt{yt}),$$

is a solution of the hyperbolic differential equation, $\partial^2\phi/\partial x\partial y = \phi$ satisfying the boundary conditions $\phi_0(o,y) = 0$, $\phi_0(x,0) = e^x - 1$. It appears in the theory of non-steady heat exchange between a fluid and a porous solid,[1] and also in the theory of ion exchange columns.[2] The present table gives $e^{-(x+y)}$ $\phi_0(x,y)$ for

$$x = y = 0(0.1)\ 5(0.2)\ 10(0.5)\ 20(1)\ 50(2)\ 100(5)\ 200(10)\ 500,\ 6D.$$

The calculations were carried out on an IBM Card Programmed Electronic Calculator. The present table is an extension of a much smaller table that has previously been announced (*MTAC*, v. 2, p. 221). A copy of the table will be made available on loan on application to the authors.

[1] A. ANZELIUS, *Zeit. angew. Math. Mech.*, v. 6, 1926, p. 291–294. T. E. W. SCHUMANN, Franklin Inst., *Jn.*, v. 208, 1929, p. 405–416. S. R. BRINKLEY, JR., *Jn. App. Phys.*, v. 18, 1947, p. 582–585.

[2] H. C. THOMAS, Amer. Chem. Soc., *Jn.*, v. 66, 1944, p. 1664–1666.

142[L].—K. Higa, *Table of* $\int_0^\infty u^{-1} \exp\{-(\lambda u + u^{-2})\}du$. One page typewritten manuscript. Deposited in the UMT File.

The table is for $\lambda = .01,.012(.004).2(.1)1(.5)10$. The values are given to 3S.

L. A. Aroian

Hughes Aircraft Co.
Culver City, California

143[L].—Y. L. Luke. *Tables of an Incomplete Bessel Function.* 13 pages photostat of manuscript tables. Deposited in the UMT File.

The tables refer to the function

$$j_n(\mu,\theta) = \int_0^\theta \exp\{i\mu\cos\phi\}\cos n\phi d\phi.$$

Values are given to 9D for

$$\begin{aligned} n &= 0, 1, 2 \\ \cos\theta &= -.2(.1).9 \\ &= 49\omega/51,\ \omega = 0(.04).52. \end{aligned}$$

There are also auxiliary tables. The tables are intended to be applied to aerodynamic flutter calculations with Mach number .7.

Y. L. Luke

Midwest Research Institute
Kansas City, Missouri

AUTOMATIC COMPUTING MACHINERY

Edited by the Staff of the Machine Development Laboratory of the National Bureau of Standards. Correspondence regarding the Section should be directed to Dr. E. W. Cannon, 415 South Building, National Bureau of Standards, Washington 25, D. C.

Technical Developments

Fundamental Concepts of the Digital Differential Analyzer Method of Computation

Introduction.—Two fundamentally different approaches have been developed in using machines as aids to calculating. These have come to be known as analog and digital approaches. There have been many definitions given for the two systems but the most common ones differentiate between the use of physical quantities and numbers to perform the required automatic calculations.

In solving problems where addition, subtraction, division and multiplication are clearly indicated by the numerical nature of the problem and the data, a digital machine for computation is appropriate.

When problems have involved calculus methods, as, for instance, in the solution of differential equations, the analog computer has often been used,