The author considers the particular solutions of (1), given by

$$v(x, y) = \frac{C}{4\pi^2} \cdot [Z_0 - R_k(x, y)], \quad \text{if} \geqq 0 \tag{2}$$

$$= 0, \quad \text{otherwise}$$

with

$$R_k(x, y) = \frac{1}{1+k} \left\{ Z \begin{vmatrix} 0 & 0 \\ x & y \end{vmatrix} (2) + k \cdot Z \begin{vmatrix} 0 & 0 \\ x + \frac{1}{2} & y + \frac{1}{2} \end{vmatrix} (2) \right\}.$$

Here $Z \left| \begin{smallmatrix} 0 & 0 \\ x & y \end{smallmatrix} \right| (2)$ is the Epstein zeta function of the second order. The solutions (2) are periodic in $x$ and $y$, with period 1. The contour lines of $R_k(x, y)$ are drawn for $k = 2(1)9$ and 5.098. Choosing as $Z_0$ in (2) the value of a contour line, the domain of flow (the region where $v > 0$) can be obtained from the graphs. This domain of flow can consist of several homeomorphic components. The connectivity of the component depends on $k$ and $\epsilon$. Here $\epsilon$, the porosity, is the ratio of the area of domain of flow to the total area. This connectivity is shown for $0 \leqq \epsilon \leqq 1$ and $1 \leqq k \leqq 9$; it is either 1, 2 or $\infty$.

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**131[L, X].**—HAROLD T. DAVIS, *Tables of the Mathematical Functions*, The Principia Press of Trinity University, San Antonio, Texas, 1963, Vol. I, xiii + 401 pp.; Vol. II, xiv + 391 pp., 26 cm. Price \$8.75 each.

These two volumes constitute a revised edition of the work originally entitled *Tables of the Higher Mathematical Functions*, which was published in two volumes in 1933 and 1935, respectively. A third volume [1], which first appeared in 1962, has been reviewed in this journal.

The first volume has now been revised and enlarged by the inclusion of two tables (12A and 12B) giving, respectively, log $\Gamma(x)$ to 12D for $x = 100(1)3100$ and $1/\Gamma(x)$ to 25D or 25S for $x = 1(1)100$. In the table of contents (p. viii) the range of the first of these tables is erroneously given as identical with that of the second.

A valuable feature of this work is the inclusion in Volume I of an elaborate introductory section of 172 pages, entitled Tables and Table Making, which contains detailed information on: the classification and history of mathematical tables; modern mathematical instruments of calculation (such as, Taylor's theorem, analytic continuation, Laurent series, asymptotic series, methods of saddle points and of steepest descent); and interpolation (including tables of interpolation coefficients and derivative coefficients, generally to 10D). A selected bibliography of more than 300 titles concludes this section of the book.

The remainder of the first volume is devoted to a detailed discussion of the properties of the gamma function and its logarithmic derivative, the psi function, together with extensive tables of these functions. The 12 tables in the original edition have been retained, with a number of known errors corrected. Herein $\Gamma(x)$ and its common logarithm are tabulated to from 10D to 20D over the interval

$-10 \leqq x \leqq 101$ at subintervals varying from $10^{-4}$ to $10^{-1}$, and $\psi(x)$ and $\log|\psi(x)|$ are given to from 10D to 18D over the interval $-10 \leqq x \leqq 450$ at subintervals varying from $10^{-4}$ to 0.5. Furthermore, the real and imaginary parts of $1/\Gamma(re^{i\theta})$ are given to 12D for $r = -1(0.1)1$ and $\theta = 0°, 30°, 45°, 60°, 90°, 120°, 135°, 150°$.

Volume II remains virtually unaltered in the present edition. A supplementary bibliography of nearly 70 titles has been retained. In his preface Professor Davis acknowledges the current inadequacy of his bibliography, and refers the reader to the FMRC Index [2] and to his index [3], compiled in collaboration with Vera J. Fisher.

In this second volume the first four derivatives of the psi function are tabulated in a series of 16 tables to from 10D to 19D over the interval $-10 \leqq x \leqq 100$, at subintervals varying from 0.01 to 0.1. The next two sets of tables relate to the Bernoulli and Euler polynomials. These 11 tables include: values of $B_n(x)$ and $E_n(x)$ to 10D for $n = 2(1)8$, $x = 0(0.01)1$; numerators and denominators of the first 90 Bernoulli numbers, $B_n$, and the first 62 as repeating decimals; $\log B_n$ to 10D and $B_n$ to 9S, for $n = 1(1)250$; exact values of the first 50 Euler numbers, $E_n$; $\log E_n$ to 12D and $E_n$ to 10S, for $n = 1(1)250$; tables of the sums $S_n$ to 32D of the reciprocals of powers of the positive integers, for $n = 2(1)100$, and sums of related series; 24D values of $\log S_n$ and $\sum_n$, the sum of the reciprocals of the $n$th powers of the primes, for $n = 2(1)80$; exact values of $S_n(p)$, the sum of the $n$th powers of the first $p$ positive integers, for $n = 1(1)10$, $p = 1(1)100$, and $n = 1(1)3$, $p = 101(1)1000$; 12D values of the coefficients $A_n(r)$ in Lubbock's summation formula, for $n = 2(1)7$, $r = 2(1)100$.

This volume is concluded with a discussion of Gram polynomials and two sets of tables of coefficients to 10S for fitting polynomials to equally spaced data by the method of least squares.

Although a number of known errors in the first edition have been corrected in this one, there remain several reported errors that have escaped the attention of the author. Principal among these are two corrections announced in this journal [4]; namely, in Volume I, on p. 201 the value of $\Gamma(1.0255)$ should read 0.98590 94917 instead of 0.98590 26815, and on p. 250 the value of $\log\Gamma(22.7)$ should read 20.6459 . . . instead of 20.5459 . . . . On pages 805 and 806 of reference [2] there appear lists of errors in the first edition of these tables. The error noted in $\log\psi'(0.01)$ persists: *for* 4.00002 69776, *read* 4.00007 04027. Other errors noted therein that remain uncorrected occur in $\Gamma(1.664)$ and its common logarithm, in $\psi(1.017)$, and in $\log|\psi(x)|$ for $x = 1.299, 1.451, 1.458, 1.473$, and 1.475. Furthermore, the final digit of $\Gamma(1.564)$ has been erroneously changed to 4 instead of 5, and a similar last-place error appears in $\Gamma(1.986)$, where the ending digit should be 0 instead of 1. A more serious error in correction occurs in $\log\Gamma(85.9)$, where the eighth decimal place should be 4 instead of 7.

These relatively few errors remaining in the new edition should not significantly detract from the value of this impressive work, which thirty years after its initial appearance still contains the most extensive published tables of the gamma and polygamma functions.

J. W. W.

1. H. T. DAVIS & VERA J. FISHER, *Tables of the Mathematical Functions: Arithmetical Tables*, Volume III, Principia Press, San Antonio, Texas, 1962. See *Math. Comp.*, v. 17, 1963, pp. 459–461, RMT **68**.
2. A. FLETCHER, J. C. P. MILLER, L. ROSENHEAD & L. J. COMRIE, *An Index of Mathematical Tables*, second edition, Addison-Wesley Publishing Co., Reading, Massachusetts, 1962.
3. H. T. DAVIS & VERA FISHER, *A Bibliography and Index of Mathematical Tables*, Northwestern University, Evanston, Illinois, 1949.
4. *MTAC*, v. 10, 1956, p. 180, MTE **248**.

**132[M].**—MAX MORRIS & ORLEY E. BROWN, *Differential Equations*, Fourth Edition, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1964, vi + 366 pp., 22 cm. Price $11.35.

The first edition of this book was published in 1933. At that time it was stated in the preface that the text had been designed for use in colleges and engineering schools for students with a background of only a first-year course in calculus. The present edition differs from the original only in the addition or deletion of certain topics. A short section on Laplace transforms has been added and considerably more emphasis is placed on numerical solution of both ordinary and partial differential equations. Throughout the text the manipulatory aspects of differential equations are stressed. There is little emphasis on proving theorems of any kind. A number of the most important theorems are stated without proof.

It is possible to get a general idea of the coverage of this book from the list of the chapter titles. Thus, we have Chapter 1, "Introduction," Chapter 2, "Differential Equations of the First Order and First Degree," Chapter 3, "Equations of the First Order But Not of the First Degree," Chapter 4, "Linear Differential Equations," Chapter 5, "Numerical Methods for Ordinary Differential Equations," Chapter 6, "Integration in Series," Chapter 7, "Linear Partial Differential Equations with Constant Coefficients," and Chapter 8, "Numerical Solutions of Partial Differential Equations." The treatment of the various topics in the different chapters is similar to that contained in many of the older or more elementary text books on differential equations.

The topics introduced in this edition have been chosen with an eye to modernizing the text book. This has not been wholly successful. For example, the treatment of the Laplace transform is purely formal and hardly gives the student sufficient material to make use of it. The additional material on the numerical solution of ordinary and partial differential equations has been more successfully introduced. It represents very useful and important material. Several items involving the formal solution of partial differential equations in terms of arbitrary functions have been deleted from the present edition. The reviewer feels that this represents a distinct improvement in the text. Much of this formal material does not represent the approach to differential equations usually taken in more modern texts. In addition, it does not aid the student in any way when he is forced to approach the solution of a practical problem by using numerical techniques.

The outstanding feature of this particular text has been retained through all the editions. This is the large number of carefully selected problems together with answers. Any student who works through this large group of problems will certainly be able to produce formal solutions of many types of ordinary differential equations. This particular feature of the book would recommend its adoption over other texts