Of the tables provided, those of ordinates of the normal curve and squares and square roots seem unnecessarily full. A brief classified bibliography should prove useful to those who wish to go further in the subject: some of its entries evidently look forward to considerable progress on the part of the student.

The book is well printed and produced and the price is reasonable.

A. J. HOWIE

RICHTMEYER, R. D., *Difference Methods for Initial-Value Problems* (Interscience, New York, 1958), 238 pp., $7.25

The theory and practice of replacing partial differential equations by systems of finite-difference equations and solving them by a step-wise process are treated in this well-written and attractive volume. Part I is devoted to the theory. Here the convergence of the approximate solution to the true solution of the differential equation is discussed as well as such topics as the rates of convergence and stability of systems of difference equations, and methods of solving implicit difference systems. The general theory is based on Lax's theorem on the connexion between stability and convergence. It is then applied to initial-value problems for equations with constant coefficients. Part II, which forms the larger part of the book, is devoted to the study of special problems in mathematical physics.

This excellent book can be recommended to those interested in the theory of partial differential equations (as well as in applied mathematics) and particularly to research workers using high-speed computers to obtain solutions of initial-value problems.

I. N. SNEDDON

HASELGROVE, C. B., AND MILLER, J. C. P. *Tables of the Riemann Zeta Function*, Royal Society Math. Tables, No. 6 (Cambridge, 1960), 50s.

This volume contains tables of the following functions: (i) $\mathscr{R}\zeta(\frac{1}{2}+it)$, $\mathscr{I}\zeta(\frac{1}{2}+it)$, $Z(t)$, $\theta(t)$, $\mathscr{R}\zeta(1+it)$, $\mathscr{I}\zeta(1+it)$ to six decimals over the range $t = 0(0\cdot1)100$. (ii) $Z(t)$ to six decimals for $t = 100(0\cdot1)1000$. (iii) The first 1600 zeros γ_n of $\zeta(\frac{1}{2}+it)$ $(t<2090\cdot4)$ to six decimals, with various auxiliary quantities such as $|\zeta'(\frac{1}{2}+i\gamma_n)|$. (iv) Values of $Z(t)$ for miscellaneous ranges of t, namely $7000(0\cdot1)7025$, $17120(0\cdot1)17145$, $100000(0\cdot1)100025$ and $250000(0\cdot1)250025$ to illustrate various irregularities; thus the largest value of $|Z(t)|$ so far found, of approximately 19, occurs near $t = 17123$. (v) $\pi^{-1}\mathrm{ph}\Gamma(\frac{1}{2}+it)$ to six decimals for $t = 0(0\cdot1)50(1)600(2)1000$.

Here $Z(t) = \pm|\zeta(\frac{1}{2}+it)|$, the sign being changed as t passes through each zero, and

$$\theta(t) = \frac{1}{\pi}\,\mathrm{ph}\left\{\pi^{-\frac{1}{2}it}\,\Gamma(\tfrac{1}{4}+\tfrac{1}{2}it)\right\}.$$

The use of the notation ph (for *phase*) in place of the customary somewhat ambiguous notations of arg and amp will be observed.

The methods of computation used are fully described. The work was carried out on the Cambridge EDSAC and Manchester Mark I machines and was checked by independent calculations using different formulae. Information of the kind given in the tables has already been used by Dr. Haselgrove to disprove a conjecture of Pólya; it is to be hoped that the tables will prove to be of further use in settling other unsolved problems in the theory of numbers.

The following errors were noted: On p. xi, line 6 from bottom, read 0 for (0); on p. xii, line 5, read $\zeta'(\rho_n)$ for $\zeta(\rho_n)$.

R. A. RANKIN