trices and systems of linear equations, and the solution of initial-value and boundary-value problems in ordinary differential equations. Unusual features include discussions of Muller's method for solving nonlinear equations, Romberg integration, and minimax polynomial approximation.

Of course, within the space limitations of any text, especially one designed for a one-semester course, a number of omissions are unavoidable. For example, in the present case we have to refer elsewhere for discussions of such computational tools as asymptotic series, continued fractions, the Monte Carlo method, and curve fitting, to name just a few.

This reviewer also noted a number of errors, most of them typographical. For example, on p. 51, 1.11 the reference should be to Eq. (2.28) instead of Eq. (2.27). On pp. 73 and 74 the value of $K(1)$ should read 1.5709 instead of 1.5708. In Chapter 4, beginning on p. 130 the numbers in the headings of the tables should be increased by a unit in the decimal digit, for example, Table 4.3 in place of Table 4.2. This correction of course entails corresponding changes in the references to these tables. On p. 134, lines 2 and 3 from the bottom, for $O(h^3)$ read $O(h^5)$. On p. 137, in formula (4.62 d) the error term involves $f^{\text{vi}}(\xi)$, not $f^{\text{iv}}(\xi)$. On p. 138, line 6 from the bottom, for $i + 0$ read $i = 0$. On p. 141, 1.11, the second and third letters in "those" have been transposed. On p. 246, in Eq. (6.71) the expression for β_2 should read

$$-\left(1 - \frac{Ah}{3}\right) + O(h^2) \quad \text{instead of} \quad -(1 - Ah) + O(h^2)\,,$$

and in Eq. (6.72) the last term should read

$$C_2(-1)^n e^{-Ax_n/3} \quad \text{instead of} \quad C_2(-1)^n e^{-Ax_n}\,.$$

Despite these minor flaws, the over-all impression is that of an attractively written, teachable textbook, supplied with a good selection of exercises for the student and an appended list of carefully selected references for further study.

J. W. W.

74[X].—Henry L. Garabedian, Editor, *Approximation of Functions*, Proceedings of the Symposium on Approximation of Functions, General Motors Research Laboratories, Warren, Michigan, 1964, Elsevier Publishing Company, New York, 1965, viii + 220 pp., 25 cm. Price $13.00.

This book contains the following thirteen articles:

(1) J. L. Walsh, The Convergence of Sequences of Rational Functions of Best Approximation with Some Free Poles.

(2) Arthur Sard, Uses of Hilbert Space in Approximation.

(3) R. C. Buck, Applications of Duality in Approximation Theory.

(4) Lothar Collatz, Inclusion Theorems for the Minimal Distance in Rational Tschebyscheff Approximation with Several Variables.

(5) P. Fox, A. A. Goldstein, and G. Lastman, Rational Approximation on Finite Point Sets.

(6) E. L. Stiefel, Phase Methods for Polynomial Approximation.

(7) Michael Golomb, Optimal and Nearly-Optimal Linear Approximation.

(8) E. W. Cheney, Approximation by Generalized Rational Functions.

(9) J. R. Rice, Nonlinear Approximation.

(10) F. L. Bauer, Nonlinear Sequence Transformations.

(11) P. J. Davis, Approximation Theory in the First Two Decades of Electronic Computers.

(12) Garrett Birkhoff and C. R. DeBoor, Piecewise Polynomial Interpolation and Approximation.

(13) G. G. Lorentz, Russian Literature on Approximation in 1958–1964.

The theory of approximation of functions by means of simpler functions has been on the mathematical scene for several centuries now. As the editor of this volume remarks in his preface, in recent years there has been a great resurgence of interest in this topic stimulated, without doubt, by the needs of the electronic digital computer. The collection of articles under review is a particularly good one; (2), (3), (7), (11), (12), and (13) are extremely useful surveys of the areas with which they are concerned. In (2) Sard makes the point that it is worth some effort to recast a problem in Hilbert space in view of the ease with which approximations in Hilbert space can be constructed. In (3) Buck surveys applications of a duality principle which replaces the problem of finding a closest element in a subspace to a given element of a Banach space by one of maximizing the value of a linear functional on the given element among all linear functionals of norm one which annihilate the subspace. In (7) Golomb examines the possibility of approximating best approximations by means of linear operators on the approximees. (11) is a delightful overview of the approximation scene by Davis, a genial blending of Gilbert and Hilbert. In (12) Birkhoff and De Boor give us an excellent survey of interpolation and approximation by spline functions, an area of much current research, particularly in this country. Lorentz' brief discussion in (13) of the recent Russian literature, encompassing as it does more than 160 bibliographic items, is a tour de force of incalculable value to those unable to read Russian (but able to read English).

It is clear from these papers that the single area of greatest current interest in this field is approximation by nonlinear families (i.e., functions which depend nonlinearly on their parameters. Thus polynomials are linear, since they depend linearly on their coefficients) and, in particular, rational function approximation. In (1) Walsh continues his important work in the complex domain. Walsh's book, *Interpolation and Approximation by Rational Functions in the Complex Domain*, which appeared in 1935, was one of the foundation stones on which recent developments in this area have been built, and its author remains one of the leading builders. Collatz in (4) discusses some configurations of what he calls H-sets, relatives of the alternating sets of the linear theory, in the little understood case of functions of more than one variable. In (5) the authors present algorithms for approximating functions of several variables on a discrete point set, while in (8) Cheney studies approximation by a ratio of functions each of which is a linear combination of linearly independent functions. In (9), Rice places the general nonlinear approximation problem in a geometric framework, the beginning of an ambitious and important program.

The remaining papers are (6), Stiefel's elegant new approach to polynomial approximation and (10), Bauer's survey of sequence transformations and their convergence accelerating potentialities.

All in all, this volume gives a panoramic view of a rich and flourishing field of

mathematics, where new theoretical developments go hand in hand with important practical applications.

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75[X].—N. L. JOHNSON, *Tables to Facilitate Fitting S_U Frequency Curves*, New Statistical Tables Series No. 32, Biometrika Office, University College, London, University Printing House, Cambridge, England, 1965, 12 pp. Price 5s.

Let

$$z = \gamma + \delta \sinh^{-1} y$$

where y is a normal random variable with mean 0 and variance 1. The moments of z are involved functions of γ and δ. Tables with four significant figures for γ and δ are given in terms of the moment ratios $\sqrt{\beta_1}$ and β_2. The domain is $\sqrt{\beta_1} = 0.05(.05)2.00$ and β_2 from 3.2 to 15.0, first in steps of 0.1 and then in steps of 0.2.

Methods of interpolation, related tables, examples, and the method by which this table was constructed are presented.

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EDITORIAL NOTE: These tables appeared originally in *Biometrika*, v. 52, 1965, pp. 547–558.

76[X].—EUGENE ISAACSON & HERBERT BISHOP KELLER, *Analysis of Numerical Methods*, John Wiley and Sons, Inc., New York, 1966, xv + 541 pp., 24 cm. Price $11.95.

This book on numerical analysis has certain special features which should make it a welcome addition to the array of texts on this subject. Its position is somewhere in between a text for a stiff undergraduate course and a text for a moderate first graduate course. It contains a great deal of material, which is somewhat surprising since it is written in a style which avoids conciseness in presentation. This almost breezy approach to a mathematics text is, from my point of view, good because it gives a feeling of familiarity or of being comfortable with the ideas and techniques of the subject.

The book suffers from a complete absence of numerical examples, which must be supplied independently.

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77[X].—C. BALLESTER & V. PEREYRA, *Supplement to Bickley's Table for Numerical Differentiation*, ms. of 19 typewritten pages deposited in the UMT file and reproduced on the Microfiche page attached to this issue.