REVIEWS AND DESCRIPTIONS OF TABLES AND BOOKS

The numbers in brackets are assigned according to the indexing system printed in Volume 22, Number 101, January 1968, page 212.

49 [2.00, 3, 4, 5, 6, 7, 8].—CARL-ERIK FROBERG, *Introduction to Numerical Analysis*, Addison-Wesley Publishing Co., Reading, Mass., 1969, xii + 433 pp., 24 cm. Price $11.95.

This is an expansion and revision of the 1st edition of 1965 which in turn was a translation and minor revision of the 1962 Swedish original. The first edition covered a wide range of topics within its 340 pages: nonlinear equations, linear systems and matrix inversion, matrix eigenvalue problems, approximation, interpolation and numerical quadrature, ordinary and partial differential equations, Monte Carlo, and linear programming. Moreover, within each of these broad headings, the author tried to say something about a great variety of methods and subtopics with the result that a large portion of the book is either written in a terse style that the uninitiated will find tough going or is so condensed as to be almost useless (e.g., two pages on boundary value problems for ODE, one page on systems of nonlinear equations, a half page on the LR method). Although this revision amplifies a few discussions (e.g., stability of multistep methods), the bulk of the additional 100 pages goes to new topics including the optimum ω for SOR, the QR method, Hyman's method, the Adams-Bashford-Moulton methods, and two new chapters on linear integral equations and special functions. But, again, some of this new material is so condensed that its value is questionable (e.g., one page on Fredholm equations of the first kind with no mention of the intrinsic difficulties associated with this problem).

Moreover, such serious deficiencies of the first edition as lack of discussion of interchanges with Gaussian elimination have not been corrected.

Nevertheless, the reviewer feels that this book is one of the better introductions available and, in the hands of an experienced instructor willing to amplify, clarify, and edit, can be a satisfactory text for both one and two semester undergraduate courses.

J. M. O.

50 [2.00, 3, 4, 5, 13. 35].—SHAHEN A. HOVANESSIAN & LOUIS A. PIPES, *Digital Computer Methods in Engineering*, McGraw-Hill Book Co., New York, 1969, xvi + 400 pp., 24 cm. Price $14.50.

This book covers most of the standard problem areas expected in an introduction to numerical analysis, but also contains short chapters on linear and dynamic programming and the fast Fourier transform. Many methods are illustrated by Fortran programs and each chapter ends with exercises, mostly of elementary mathematical type.

With the exception of three or four examples and a few exercises, however, the book is not especially directed towards engineers and must be judged in relation to the many standard numerical analysis texts which now exist. In this comparison,

it fares quite badly as a few examples will indicate: In the chapter on eigenvalue/vector computation, the stress is put on methods which first find the characteristic polynomial (Krylov, Danilevsky). Although the power method is also discussed, no mention is made of the Givens-Householder method nor the LR/QR methods. In the discussion of Gaussian elimination for linear equations, no mention is made of the need for interchanges except when a pivot is zero. In various places throughout the book, a problem is reduced to a system of linear equations $Ax = b$ (e.g., in the least squares problem of Chapter 3) and this is followed by a directive to form $x = A^{-1}b$ where "the inverse matrix can be obtained, for example, by the augmented matrix method described in Chapter 1" (p. 149). The chapter which covers numerical integration says nothing about Gaussian quadrature or Romberg integration.

The above omissions would not be so bad if adequate references to the literature were provided. However, although 156 pages are devoted to linear equations, eigenvalues, and roots of polynomials, and 16 references are given, no mention is made of Wilkinson. Similarly, Chapters 6, 7, and 8 on differential equations contain references to several books as well as papers, but no mention of the standard works by Henrici, Varga, and Forsythe and Wasow.

All in all, this reviewer unfortunately must conclude that the book is very uneven and does little justice to the advances made in numerical analysis in the last twenty years.

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51 [2.00, 3, 4, 8, 13.00].—BRICE CARNAHAN, H. A. LUTHER & JAMES O. WILKES, *Applied Numerical Methods*, John Wiley & Sons, Inc., New York, 1969, xvii + 604 pp., 29 cm. Price $14.95.

This new, rather unevenly written and organized, compendium is a good reference book for the practicing engineer. The contents include interpolation, approximation, numerical integration, solution of polynomial equations, matrices, systems of equations, approximate solution of ordinary differential equations, approximate solution of partial differential equations, and statistical methods. Documented Fortran programs, experienced remarks on computational procedures, and meaningful applied illustrative problems are distributed abundantly throughout.

Pedagogically, however, the book presents severe problems. The sensitivity, depth, and yet low key presentation of the material on interpolation, ordinary differential equations, and parabolic equations conflicts radically with, for example, the material on matrices, in which an entire matrix course, without the more complex proofs but with selected short ones, has been compacted into a single chapter. The authors' habit of doing *all* the problems in the book on a computer, even when the exact solution is attainable by methods from high school algebra (see, e.g. p. 173), is one *not* worth passing on to readers and students. And the omission of such important contemporary topics as analysis of roundoff error in algebraic processes, spline interpolation, integral equations, Monte Carlo techniques, boundary value problems for ordinary differential equations, hyperbolic partial differential equations, the Navier-Stokes equations, linear and nonlinear programming methods, and discrete model theory give the book a sense of age and weight similar to that