300 flowcharts. Another is a rather strange use of the word 'round' to mean both round and truncate. The authors assume that the reader is familiar with binary arithmetic, not necessarily true in this reviewer's experience with college students. The explanation of computer hardware, especially on core storage, is confusing and sketchy. The book has several misprints which may confuse the beginner. However, these are all minor and should be corrected in the second printing.

The exercises are ample and excellent and should serve students with a wide range of aptitudes and interests. In combination with one of the programming supplements, or with any programming text, the book should be very successful in classroom use.

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5[3].—ROBERT T. GREGORY & DAVID L. KARNEY, *A Collection of Matrices for Testing Computational Algorithms*, John Wiley & Sons, Inc., 1969, ix + 154 pp., 28 cm. Price $9.95.

A much needed collection of matrices for testing algorithms, which arise in numerical linear algebra, is provided by this book. The authors provide both well-conditioned and ill-conditioned test matrices for algorithms concerning: (1) inverses, systems of linear equations, determinants and (2) eigensystems of real symmetric, real nonsymmetric, complex, and tridiagonal matrices. The construction of test matrices is discussed, and a large number of references and a table of symbols is provided.

The authors do not discuss the perplexing problem concerning how a user must choose the appropriate test matrices. In particular, test matrices must be chosen so that all parts of the algorithm are tested. It may not be clear to a user by looking at the examples which matrix (if any) will go through a particular part of his algorithm. Then, he must construct his own examples by working backwards through his algorithm.

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6[5].—DALE U. VON ROSENBERG, *Methods for the Numerical Solution of Partial Differential Equations*, American Elsevier Publishing Co., Inc., New York, 1969, xii + 128 pp. Price $9.50.

This book serves as a good introduction for anyone interested in finite difference methods. In the preface, the author states "This book is written so that a senior undergraduate or first-year graduate student in engineering or science can learn to use these methods in a single semester course, and so that an engineer in industry can learn them by self-study." The book succeeds admirably. The style is very readable and the physical background of each equation is discussed. Each chapter ends with a specific problem which is completely worked out including a program and computer time.

Specifically, in chapter one, the example of heat conduction in an insulated tapered rod with various boundary conditions is used to illustrate some methods for linear ordinary differential equations.

In chapter two, linear parabolic partial differential equations are treated. The forward difference, backward difference and Crank-Nicolson schemes are derived and the stability analysis for each is carried out.

In chapter three linear hyperbolic equations, including systems, are dealt with.

Chapter four is concerned with alternate forms of the coefficient matrices generated by the difference schemes.

Chapters five and six deal with nonlinear parabolic and hyperbolic equations, and chapter seven describes nonlinear boundary conditions.

Chapters two through seven deal with equations with one space variable.

Chapter eight describes parabolic and elliptic equations in two and three space dimensions and includes Alternating-Direction-Implicit schemes.

Chapter nine mentions some examples of complications which can arise in the problems treated earlier, for example shock waves in hyperbolic equations.

There is an appendix of algorithms useful in solving the types of equations generated by the difference schemes.

One slight drawback for use as a text is that no exercises are provided. More serious is the fact that function space approximation methods are not mentioned at all, and the title of the book might lead a student to believe that finite differences are the only known methods for obtaining numerical solutions.

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7[7].—J. W. WRENCH, JR., *The Converging Factor for the Modified Bessel Function of the Second Kind*, NSRDC Report 3268, Naval Ship Research and Development Center, Washington, D. C., January 1970, ii + 56 pp., 26 cm.

This report, which follows the pattern of two earlier reports [1] and [2] (see *Math. Comp.*, v. 20, 1966, pp. 457–458, RMT 71), is concerned with the development of methods and provision of auxiliary tables for the high-precision calculation of the converging factor in the asymptotic expansion of the modified Bessel function of the second kind, $K_p(x)$. While much of the analytical discussion is quite general, the practical application is restricted to functions of integer order and positive real argument.

The converging factor is defined as "that factor by which the last term of a truncated series (usually asymptotic) approximating the function must be multiplied to compensate for the omitted terms." Thus in the case of the function $K_p(x)$ we have

$$K_p(x) = (\pi/2x)^{1/2}e^{-x}\left\{1 + \frac{a_1(p)}{x} + \frac{a_2(p)}{x^2} + \cdots + \frac{a_n(p)}{x^n}\,\sigma_{n,p}(x)\right\},$$