f is some vector function. Defining $U = P\bar{u}$, and $F = Pf$, Eq. 1 becomes

$$RU(x) + LU(x) = F, \tag{2}$$

which is a system of difference equations in U as a function of x; Eq. 2 is then solved explicitly.

The method is most effective when applied to the basic differential equations of mathematical physics for rectangular regions with many mesh points, for it does not require excessive computation and so prevents the accumulation of computational errors. For more general equations and regions it becomes difficult to use this method, for solutions to Eq. 2 cannot then be easily obtained.

The author stresses the fact that the development of new and more efficient mathematical methods is fully as important as the development of faster computing machines; his method represents a useful and interesting step in this direction.

The book is divided into two chapters and one appendix. In Chapter 1, explicit solutions are obtained for various difference equations in one variable, corresponding to Eq. 2; in Chapter 2 problems associated with Laplace's equation, the wave and heat equations and others are examined, using the author's method. In the Appendix, additional examples and some extensions of the theory are given.

The presentation of the material is at times hard to follow, and no clear explanation of the author's method is given at any point. There are some slight misprints, and two references (Nos. 16, 71) are missing. Nevertheless, the book is of definite value and interest.

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13[X].—James F. Price, *Numerical Analysis and Related Literature for Scientific Computer Users*, 2nd ed., Math. Note No. 456, Mathematics Research Laboratory, Boeing Scientific Research Laboratories, Seattle, Washington, March 1966, viii + 191 pp., 28 cm.

The explosive growth of publications in the field of numerical analysis is reflected in the relative size of the second edition of this annotated bibliography. Thus, we now find listed the contents of 151 books in English, whereas the first edition, dated May 1961, listed 69 book titles. Furthermore, the author states in the Preface that the present list is not quite as complete as the original one, and several books previously reviewed have now been dropped.

It is stated in the Introduction that this document was prepared to assist the large number of computer programmers who are not specialists in numerical analysis.

The body of this document consists of three main subdivisions. The first, entitled Numerical Procedures in Books, lists alphabetically by author the great majority of the texts in English on numerical analysis, as well as a very limited selection of related books. Those references considered by the present author to be especially helpful for computer users are designated by a double asterisk. For each book listed a brief summary is provided, indicating the level of difficulty, and the table of contents is reproduced.

Part II, entitled How to Find What You Want, describes a procedure for looking up given subjects in the literature. General guides to mathematical literature, abstracting journals, and specialized bibliographies are cited and briefly described. Special attention is given the problem of obtaining information about the large number of existing mathematical tables. Also, a list of recommended periodicals is included to assist the reader in keeping up with the current literature in numerical analysis. The four periodicals especially recommended are *Mathematics of Computation*, *Numerische Mathematik*, *Siam Journal on Numerical Analysis*, and *Computing Reviews*.

The third and concluding part of this document consists of a 27-page subject index, which is particularly useful. When more than five references are listed for a given subject the author has underlined a smaller number, which might be consulted first by the reader.

As he states in the Introduction, the author has not attempted to make this bibliography complete in any sense, nor has he included any foreign language references. He does point out, however, that many good Russian books have been translated into English and these are accordingly listed herein.

This attractively printed, conveniently arranged bibliography should provide considerable assistance to anyone searching through the English-language literature in numerical analysis.

J. W. W.

14[X].—A. H. STROUD & DON SECREST, *Gaussian Quadrature Formulas*, Prentice-Hall, Englewood Cliffs, N. J., 1966, 24 cm. Price $14.95.

This is a valuable reference book for the use and application of Gaussian quadrature formulae. Not too many years ago, quadrature almost always was done with equally spaced data and the familiar Newton-Cotes quadrature formulae. The advantages of this approach are that most tables of special and other functions are given in equally spaced form so that no interpolation is required and further, much of the same data can be used for more than one formula of the Newton-Cotes variety. A disadvantage is the fact that the Newton-Cotes formulae are usually asymptotically divergent with respect to the number of points used. On the other hand, a disadvantage of Gaussian quadrature formulae is that the data are not equally spaced and that data for an n-point formula cannot be used for an m-point formula, $m > n$. Advantages of Gaussian quadrature formulae are that they converge under conditions which are most always realizable in practice and the order of precision with reference to the degree of the polynomial for which a specific formula is exact is much greater than that for the corresponding Newton-Cotes formula. The Gaussian quadrature formula nearly always uses data at points with numerical values which are irrational. But in current usage, as so much of computing is done on automatic computers, this presents no problem provided the computer can be given an efficient algorithm to compute the intergrand. Thus, Newton-Cotes formulae are by no means a relic of the past, especially if only a few calculations are needed and a desk calculator is handy, but the advent of the automatic computer enables one to exploit the advantages of Gaussian quadrature formulae over Newton-Cotes formulae while minimizing the disadvantages noted above.