divided differences, for example, succeeded in being thorough without being excessively long. The Hermite osculating polynomial is treated by means of Cauchy's Theorem. This treatment happened to be new to this reviewer and seems much more suitable for sufficiently qualified students than the more familiar long-winded discussion. In the quadrature section, the relations between the trapezoidal rules and periodic integrands is introduced early on and a treatment of Bernoulli functions and polynomials is included.

I would recommend this book for instructors who will find excellent descriptions and proofs of various standard theorems in these fields. But students should be exposed to a more realistic view of computing than the one which might be inferred from reading this book.

J. N. L.

3[2, 4, 12].—RALPH H. PENNINGTON, *Introductory Computer Methods and Numerical Analysis*, 2nd ed., The Macmillan Co., New York, 1970, xi + 497 pp., 24 cm. Price $10.95.

The first edition of this textbook was published in 1965. (For a review thereof, see *Math. Comp.*, v. 20, 1966, pp. 198–199, RMT **43**.) This second edition incorporates a number of changes, revisions, and modernizations without at the same time altering the basic character of the original work. More explicitly than before, the author stresses that—to paraphrase his words—"he is drawn toward the needs of departments devoted to science, engineering, business administration, and so on", which "find it necessary to include some computer courses for their own purposes". In line with this, fundamental concepts and rigor "were allowed to suffer to some degree in order to include a sufficient number of descriptions of algorithms to leave the reader with a reasonably versatile beginner's kit of problem-solving tools". The background prerequisites have remained at the integral calculus level.

The overall organization of the book is essentially the same as before, although the arrangement of the material and its subdivision into chapters has been improved in places. The first five chapters now present the introduction to the fundamentals of computers and to FORTRAN programming (using ASA standards), and the remaining eight chapters cover the basic numerical methods traditional for this level.

In recognition of the growing importance of interactive computing, a rather novel change has been the introduction of a FORTRAN variation for remote-terminal operation. Also, the artificial hypothetical machine language used before has been modernized and modified as to resemble somewhat that of, say, the IBM 360 series. The discussion of several numerical topics has been added or enlarged. Newly included are Chebyshev series, Romberg integration, and in the differential equations chapter, the Euler-Romberg method, and the Adams-Moulton formulas (instead of Milne's method). The coverage of error propagation, Gaussian quadrature, and the Runge-Kutta method has been expanded. The abandonment of Sturm sequences in favor of Graeffe's method (called erroneously Graeff's method in the text and the index) should be a matter of opinion; rather questionable appears to be the complete replacement of Gaussian elimination by the Gauss-Jordan method for the sole stated reason that the latter gives "shorter and more understandable FORTRAN

subroutines". As before, there are many illustrative examples, and the number of exercises appears to be increased.

Altogether the second edition has brought the book more in line with the present-day computer environment, and, in balance, it will probably allow it to continue serving the needs to which it was addressed by the author.

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4[2, 12].—ALEXANDRA I. FORSYTHE, THOMAS A. KEENAN, ELLIOTT I. ORGANICK & WARREN STENBERG, *Computer Science: A First Course*, John Wiley & Sons, Inc., New York, 1969, xviii + 553 pp., 24 cm. Price $9.95.

This book is a development of the School Mathematics Study Group (SMSG) text *Algorithms, Computation and Mathematics*, designed for high school students. It is a carefully written introductory text, covering fully most of the topics suggested for Course B1: Introduction to Computing, of Curriculum 68, the report of the ACM Curriculum Committee on Computer Science. In this reviewer's opinion, it is very suitable for a beginning college or junior college course in Computer Science, and is one of the best among the many texts available for courses at this level.

The work is unusual for an elementary text in that it concentrates from the outset on abstract algorithms and flowcharts for them and uses no programming language other than the author's own "flowchart language." Three supplementary programming texts are available for FORTRAN, BASIC, and PL/1. This unique method of organizing the text allows the authors to concentrate on the essential ideas of computing and algorithms unencumbered by the technical details of a particular language, which the neophyte often finds the most difficult to learn. It also has the advantage of allowing the instructor to choose whichever programming language is available to him or which he considers best for beginning students.

The book is divided into three parts. Part I introduces the student to computing and covers algorithms and flowcharts. Part II covers elementary numerical analysis and applications to computing including quadrature, simultaneous linear equations, and linear regression. Part III covers some of the newer areas of Computer Science including trees, lists, strings, and compiling. A second version of the text, *Computer Science: A Primer*, contains Parts I and II only and may be more suitable for high school use. Also published with the text is *Computer Science: Teacher's Commentary*, a very detailed supplement which seems intended for mathematics teachers with no previous experience in Computer Science. It contains complete flowcharts with comments for all of the problems in the text and additional problems, explanations and suggestions for the teacher.

The book is mathematically oriented and pays particular attention to careful development of mathematical concepts. It is well coordinated with the SMSG mathematics texts.

This reviewer has only a few complaints about the book. One is the violation of the ANSI standard for flowcharts, somewhat disturbing in a book with over