72[X].—ASKO VISAPÄÄ, *A Procedure for Finding the Coefficients of the Best Fitting Second and Third Degree Polynomials by Application of the Method of Least Squares*, The State Institute for Technical Research, Helsinki, Finland, 1966, 32 pp.

This booklet gives explicit formulas for the coefficients of second and third degree polynomials fitted to data by the method of least squares. It also gives a procedure for carrying out the computations on a desk calculator (including, in an appendix, an illustrative "program" for use on a particular electronic calculator). The given procedure, however, is defective, and this reviewer cannot recommend it. One defect of the scheme is that it provides no checks to detect arithmetic errors. The author's fifth example, where a transposition error goes undetected with the result that the calculated coefficients are wrong, clearly illustrates this pitfall. A more serious defect is the failure to consider the effect of rounding errors—errors which can easily be severe in solving linear equations. That it is usually necessary to code the data in order to reduce the rounding error, as well as to reduce the volume of computations, is ignored in the procedure given here.

A much better scheme of computations oriented to desk calculators is given in P. G. Guest's *Numerical Methods of Curve Fitting*, Cambridge University Press, 1961, pp. 147–160. The Doolittle method as presented by Guest includes a check column, and the question of coding is discussed. Moreover, Guest furnishes formulas and methods for calculating standard deviations and an analysis of variance table. Such features were omitted by Visapää.

Alternative methods of solving linear equations by desk calculators are described in considerable detail and illustrated by numerical examples in L. Fox's "Practical Solution of Linear Equations and Inversion of Matrices," a paper in *Contributions to the Solution of Systems of Linear Equations and the Determination of Eigenvalues*, edited by O. Taussky, National Bureau of Standards, Applied Mathematics Series, No. 39, U. S. Government Printing Office, Washington, D. C., 1954.

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73[X].—S. D. CONTE, *Elementary Numerical Analysis: An Algorithmic Approach*, McGraw-Hill Book Co., New York, 1965, x + 278 pp., 24 cm. Price $7.95.

This book offers an excellent introduction to the subject of Numerical Analysis. As the subtitle implies, computational procedures are summarized in the form of algorithms.

Many of the illustrative examples throughout the text are accompanied by flowcharts, Fortran IV programs, and computer results (obtained on an IBM 7090 system). Accordingly, the author presupposes knowledge of, or concurrent instruction in, a procedure-oriented computer language. However, he explicitly states that his emphasis is on an analysis of the accuracy and efficiency of algorithms.

The scope of the text may be inferred from the following enumeration of the main topics treated: number systems and errors, solution of nonlinear equations, interpolation and approximations, numerical differentiation and integration, matrices 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 $f^{vi}(\xi)$, not $f^{iv}(\xi)$. 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.