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.

1[2.05, 2.35].—J. Kowalik & M. R. Osborne, *Methods for Unconstrained Optimization Problems*, American Elsevier Publishing Co., Inc., New York, 1969, xii + 148 pp., 24 cm. Price $9.50.

Within the last ten years, there has been increasing interest in the problem of minimizing a function of n variables numerically. During that time several new methods have appeared and numerical experiments as well as mathematical analyses have shed much light on some of these newer as well as the older methods. The authors of this new book, the first dealing solely with this subject, address themselves to giving a survey of this material.

The first, very short, chapter contains some preliminaries and a second short chapter treats search methods such as that of Rosenbrock and of Hook and Jeeves. The third chapter considers the classical method of steepest descent as well as the more recent variation of Davidon and methods employing conjugate directions. In Chapter 4 the authors discuss the special case of least squares problems, and after a discussion of the linear problem as well as the Newton and secant methods for solving nonlinear systems of equations, the Gauss-(Newton) method together with the Levenberg modification is treated. The chapter ends with a description of a method of Powell. Chapter 5 considers various ways in which constrained problems may be handled by methods for unconstrained problems. Chapter 6 records the results of various numerical experiments. The book ends with short appendices on matrices and convexity as well as some "Notes on Recent Developments."

In contradiction to the publisher's claim, it is difficult to classify this work as a textbook. There are no exercises and the style is mostly descriptive with only a few convergence theorems proved. However, it should be useful as supplemental reading for courses in both numerical analysis and nonlinear programming as well as providing a readable introduction to the subject for practicing scientists and engineers.

J. M. O.

2[2.10].—Bruce S. Berger, Robert Danson & Robert Carpenter, *Tables of Zeros and Weights for Gauss-Hermite Quadrature for* $N = 200, 400, 600, 800, 1000$, *and* 2000, ms. of 3 typewritten pp. + 50 computer sheets deposited in the UMT file. (Copies also obtainable from Professor Berger, Department of Mechanical Engineering, The University of Maryland, College Park, Md. 20742.)

The authors continue herein their tabulation of the abscissas and weights associated with certain Gauss quadrature formulas [1], [2].

As stated in the title, the present tables relate to the Gauss-Hermite formula when the number, N, of abscissas is equal to 200(200)1000 and 2000. The abscissas x_{kN} (the zeros of the Hermite polynomial $H_N(x)$), the corresponding weights, and the products of the weights multiplied by exp (x_{kN}^2) are all tabulated in floating-point form to 27S, except for $N = 2000$, where the precision is limited to 26S. (Because of symmetry, only the positive zeros and corresponding weights are given.)

The zeros and weights were checked to the precision of the printed entries by the respective relations

$$\prod_{k=1}^{N/2} x_{kN}^2 = N!/[2^N(N/2)!] \quad \text{and} \quad 2\sum_{k=1}^{N/2} a_{kN} = \sqrt{\pi}\,.$$

Further details of the calculations are presented in the introduction to these tables, which constitute a unique supplement to the valuable tables of Stroud & Secrest [3].

J. W. W.

1. Bruce S. Berger & Robert Danson, *Tables of Zeros and Weights for Gauss-Laguerre Quadrature*, ms. deposited in UMT file. (See *Math. Comp.*, v. 22, 1968, pp. 458–459, RMT **40.**)
2. Bruce S. Berger, Robert Danson & Robert Carpenter, *Tables of Zeros and Weights for Gauss-Laguerre Quadrature to* 24S *for N* = 400, 500, *and* 600, and *Tables of Zeros and Weights for Gauss-Laguerre Quadrature to* 23S *for N* = 700, 800, *and* 900, mss. deposited in the UMT file. (See *Math. Comp.*, v. 23, 1969, p. 882, RMT **60.**)
3. A. H. Stroud & Don Secrest, *Gaussian Quadrature Formulas*, Prentice-Hall, Englewood Cliffs, N. J., 1966. (See *Math. Comp.*, v. 21, 1967, pp. 125–126, RMT **14.**)

3[2.20, 13.00].—R. J. Herbold & P. N. Ross, *The Roots of Certain Transcendental Equations*, Professional Services Department, The Procter and Gamble Co., Winton Hill Technical Center, Cincinnati, Ohio, ms. of 32 typewritten pp. deposited in the UMT file.

Herein are tabulated 15S values (in floating-point form) of the first 50 positive roots of the equations $x \tan x - k = 0$ and $x \cot x + k = 0$, for $k = 0(0.001)0.002(0.002)0.01$, 0.02(0.02)0.1(0.1)1(0.5)2(1)10(5)20(10)60(20)100. These decimal approximations to the roots were calculated on an IBM 360/65 system, using Newton-Raphson iteration programmed in double-precision Fortran.

As the authors note in their introduction, these tables can be considered to be an extension of the tables of Carslaw & Jaeger [1] for the same range of the parameter k.

A specific example of the numerical solution of a problem in the field of chemical engineering is adduced to show the practical need for these more elaborate tables.

J. W. W.

1. H. S. Carslaw & J. C. Jaeger, *Conduction of Heat in Solids*, 2nd ed., Oxford University Press, Oxford, 1959.

4[2.35, 6].—Louis B. Rall, *Computational Solution of Nonlinear Operator Equations*, John Wiley & Sons, Inc., New York, 1969, viii + 224 pp., 24 cm. Price $14.95.

The topic of this book has received an increasing amount of research in the last several years, and many books devoted at least in part to this subject have already appeared (for example, the books by Collatz, Goldstein, Kantorovich and Akilov, Keller, Kowalik and Osborne, and Ostrowski). In comparison with these existing