REVIEWS AND DESCRIPTIONS OF TABLES AND BOOKS

The numbers in brackets are assigned according to the indexing system printed in Volume 28, Number 128, October 1974, pages 1191–1194.

13[2.10.1].—MARIA ODETE RODRIGUES CADETE, *Cálculo Automático de Integrais Definidos* (Automatic Calculation of Definite Integrals), Gulbenkian Institute of Science, Scientific Computation Center, Lisbon, 1975, 173 pp., 23 cm. Price $2.50.

This booklet was prepared in connection with expository lectures on Operations Research, held from 1972 to 1974 at the Scientific Computation Center, and courses on Automatic Computation at the Higher Technical Institute. It presents a conventional treatment of classical quadrature formulas, including those of Newton-Cotes, Gauss, Chebyshev, and Euler-Maclaurin. Notwithstanding the title, there is no discussion of automatic integration, as the term is understood today, and references to more modern treatments (e.g., [1]–[4]) are conspicuously absent from the bibliography. The appendix, however, contains FORTRAN programs for generating abscissas and weights of the classical Gauss-type quadrature formulas.

W. G.

1. P. J. DAVIS & P. RABINOWITZ, *Numerical Integration,* Ginn (Blaisdell), Boston, Mass., 1967.

2. P. J. DAVIS & P. RABINOWITZ, *Methods of Numerical Integration,* Academic Press, New York, 1975.

3. A. GHIZZETTI & A. OSSICINI, *Quadrature Formulae,* Academic Press, New York, 1970.

4. A. H. STROUD & D. H. SECREST, *Gaussian Quadrature Formulas,* Prentice-Hall, Englewood Cliffs, N. J., 1966.

14[2.20, 13.30, 3.25].—MICHAEL J. TODD, *The Computation of Fixed Points and Applications,* Lecture Notes in Economics and Mathematical Systems, No. 124, Springer-Verlag, Berlin, 1976, vii + 129 pp., 25 cm. Price $7.40.

The Brouwer fixed point theorem and its relatives are important tools in analyzing problems in applied mathematics. In particular, these theorems have proved crucial for obtaining existence results for models in mathematical economics. The problem of calculating fixed points is therefore important. In recent years, beginning with the work of H. Scarf, there has been developed a class of approximate methods for finding fixed points of a map, based on combinatorial techniques. The book under review give a very readable account of these methods. Following is a brief description of the material in the eleven chapters.

In Chapter I there is a discussion of the Brouwer theorem, the famous lemmas of Sperner and Knaster, Kuratowski, and Mazurkiewicz, and the notions of simplex and triangulation. Chapter II contains examples of the use of fixed point theory in mathematical economics and nonlinear programming. Chapters III and IV give several triangu lations of the n-simplex and determine the computational algorithms corresponding to these triangulations. Chapters V and VI contain a discussion of the Kakutani fixed point theorem and its applications in economics and nonlinear programming. Chapter VII presents an algorithm for the calculation of a Kakutani fixed point. The next three chapters present the "variable size" algorithms, in which a homotopy argument is used to automatically refine the simplicial approximation. The final chapter contains ar analysis of which triangulations lead to more efficient algorithms.

The book contains little discussion of numerical experience with the various