The author makes much of his use of algorithm models as an aid in unifying the presentation of algorithms and their proofs. It would have been most interesting to see if his approach is more general than that of Zangwill who did the first extensive work in this area. Instead, we are given the sentence, "The following set of assumptions are due to Zangwill [Z1] and can be shown, though not very easily, to be stronger than [my assumptions] . . .". Such distinctions are the meat of research and it is very important not to omit proofs of such statements.

Finally, it is very amusing after the author has written so much about the importance of proposing 'implementable' as opposed to 'conceptual' algorithms to read the following step in at least seven of his 'implementable' algorithms for minimizing an unconstrained function $f^0(z)$. "Step 0. Select a $z_0 \in R^n$ such that the set $C(z_0) = \{z | f^0(z) \leqq f^0(z_0)\}$ is bounded."

This book is important because of the breadth of material it contains. The chapter on the rate of convergence of unconstrained minimization techniques is very up-to-date. For these reasons, it is a useful addition to anyone's library.

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30[2.20, 2.40].—CHIH-BING LING & JUNG LIN, *Values of Coefficients in Problems of Rotational Symmetry*, Virginia Polytechnic Institute and State University, Blacksburg, Virginia, and Tennessee Technological University, Cookeville, Tennessee, February 1972, ms. of 23 typewritten pages deposited in the UMT file.

The finite difference $\Delta^s \sigma_n$ arises frequently in problems of rotational symmetry, where σ_n is the sum of the nth powers of the roots of the equation $u^k - (u - 1)^k = 0$, $k \geqq 2$. In general, σ_n is real.

The authors tabulate $\Delta^s \sigma_n$ to 11S for $k = 3(1)8$, with $n = -4(1)65$ and $s = 0(1)k - 1$. For $s \geqq k$, values of the differences can be found from the tabulated values by the relation $\Delta^s \sigma_n = \Delta^{s-mk} \sigma_{n+mk}$, where m is a positive integer such that $0 \leqq s - mk \leqq k - 1$. In particular, for $k = 2$ we have $\Delta^s \sigma_n = (-1)^s / 2^{n+s}$.

AUTHORS' SUMMARY

31[3].—STEFAN FENYÖ, *Moderne Mathematische Methoden in der Technik*, Vol. II, Birkhäuser Verlag, Basel, 1971, 336 pp., 25 cm. Price 62—Fr.

This second volume, in contrast to the first, may be described as dealing with finite methods in applied mathematics. In three chapters, it covers linear algebra, linear and convex programming, and graph theory. While the first two chapters would offer ample opportunity for including computational considerations, the author deliberately omits such topics. He feels that their inclusion would lead beyond the scope of this book and would be contrary to the principal aim of the book, which is to develop basic mathematical ideas in as simple a manner as possible. More bluntly, the author expresses his view that "anybody who has mastered the underlying mathematical principles will have no difficulty in learning the numerical methods very quickly from the vast relevant literature."

The reviewer was astonished to discover that the second chapter (on optimization) is essentially a reproduction of the first two chapters of the book by Collatz and Wetterling [1]. Moreover, he is appalled at the incredible amount of typographical and grammatical errors, revealing little if any editorial supervision.

W. G.

1. L. COLLATZ & W. WETTERLING, *Optimierungsaufgaben,* Springer, Berlin and New York, 1966.

32[5].—GARRETT BIRKHOFF, *The Numerical Solution of Elliptic Equations,* Society for Industrial and Applied Mathematics (SIAM), Philadelphia, Pa., 1971, xi + 82 pp. Price $4.20.

This book consists of the revised notes of a series of lectures given at an NSF sponsored Regional Conference in Applied Mathematics. It gives a concise, readable and up to date survey of most available methods for the numerical solution of elliptic equations. It contains many well-chosen references and should therefore also be quite useful as a guide to further studies.

There are nine lectures. The first describes typical elliptic problems, and, in the last, the author discusses some of his experiences with complicated practical problems. Lectures two and three are on classical analysis and finite difference methods, while the following two lectures survey the well-known successive overrelaxation, semi-iterative and alternating direction methods. The sixth lecture discusses the use of the classical integral equation approach, a topic often neglected in surveys of this kind. In addition, there are two sections on approximation theory and closely related variational methods.

A discussion of special methods for problems which can be solved by separation of variables such as Hockney's and Buneman's methods, of great importance in specialized applications, is missing. Cf. Hockney, *Methods in Computational Physics,* vol. 9, 1970.

The finite element method which is now rapidly being developed (to perhaps the most important numerical method for elliptic problems) is discussed only briefly. (It should be noted, however, that the following regional NSF conference dealt exclusively with variational methods. The notes by R. S. Varga are going to appear in the same series.)

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