In summary, this set of papers is compulsory reading for the researcher in global optimization, and highly recommended for those interested in gathering a flavor of the methods and applications of the subject.

GRAHAM R. WOOD

Department of Mathematics
University of Canterbury
Christchurch, New Zealand

28[49-01, 49-04, 65K10, 90C35].—DIMITRI P. BERTSEKAS, *Linear Network Optimization: Algorithms and Codes*, The MIT Press, Cambridge, MA, 1991, xi+359 pp., $23\frac{1}{2}$ cm. Price $39.95.

This book provides an introduction to the field of network optimization. The most general problem treated in the book is the *minimum-cost flow problem*, which is the problem of finding a minimum-cost flow in a network that satisfies supplies and demands at the nodes, and upper and lower bounds on the arcs. The book also treats the standard special cases of this problem, namely the assignment problem, the maximum-flow problem and the shortest-path problem. The book consists of five chapters and an appendix. Chapter 1 serves as an introduction, both to problem types and algorithmic strategies. Each of Chapters 2–4 describes an algorithmic strategy in detail; Chapter 2 focuses on the simplex methods, Chapter 3 on dual ascent methods, and Chapter 4 on auction methods. Chapter 5 provides a brief overview of the empirical performance of these methods. Finally, the appendix consists of FORTRAN listings of many of the algorithms discussed in the text.

The book is interesting for what it does, as well as for what it does not do. The book is not comprehensive, nor does it pretend to be. As the author indicates in the preface, the coverage is focused and selective. The primary algorithmic treatment of the maximum-flow and shortest-path problems is done in the introduction. The treatment of the maximum-flow problem is cursory, at best. Little mention is made of the recent preflow-push algorithms. The shortest-path problem receives a more detailed treatment, concentrating on the single-source multiple-destination version of the problem. The treatment is standard. Chapter 2, entitled *Simplex Methods*, is devoted almost entirely to a description of the primal simplex method for the minimum-cost flow problem. Again, the description is standard. Chapter 3, entitled *Dual Ascent Methods*, first describes the primal-dual method for the minimum-cost flow problem and then the relaxation method of the author. The primal-dual method is given both in its basic form and as a sequential shortest-path method. What sets this book apart from others is Chapter 4, entitled *Auction Algorithms*. This chapter is roughly twice as long as the previous two and provides an in-depth presentation of auction algorithms, which were first proposed by the author. The chapter begins by describing an auction algorithm for the assignment problem, which seems to be its most natural domain. The chapter then winds its way through variations of the basic auction algorithm applied to variations of the assignment problem. In the end, an auction algorithm for the minimum-cost flow problem is given.

The book is well written. The algorithms are motivated both through examples and intuitive reasoning. Proofs of correctness are included throughout.

The author points out useful relationships between various algorithms. Data structures needed to implement each algorithm are briefly discussed. For the most part, the book avoids worst-case complexity issues, opting instead for brief discussions of the empirical performance of the algorithms. The book is appropriate for an introductory graduate-level course. It contains a good collection of exercises. It is more or less self-contained; however, some knowledge in linear programming would be useful.

DONALD K. WAGNER

Office of Naval Research
800 North Quincy Street
Arlington, VA 22217-5000

29[68–00, 68Q40].—MARTHA L. ABELL & JAMES P. BRASELTON, *The Mathematica Handbook*, Academic Press, Boston, 1992, xvi+789 pp., $23\frac{1}{2}$ cm. Price: Softcover $32.50.

Intended as a supplement to the manual for the Macintosh version of the computer system "Mathematica" distributed by Wolfram Research Inc., this handbook is organized alphabetically rather than by topic. Its primary strength is that it provides many simple examples covering some 1500 commands. Virtually every page has one or more Macintosh computer bit-map displays.

Unfortunately, the book is typographically cluttered, the bit-map displays detract from the readability, it has not been carefully proofread, and it does not explain any of the numerous topics that are likely to remain unclear from the manual. I noted particularly inadequate coverage of such confusing subjects as Block, Module, Context, If, Function, and Patterns.

RICHARD J. FATEMAN

Computer Science Division, EECS Dept.
University of California
Berkeley, CA 94720

30[68Q40].—MALCOLM A. H. MACCALLUM & FRANCIS J. WRIGHT, *Algebraic Computing with REDUCE*, Lecture Notes from the First Brazilian School on Computer Algebra, Vol. 1, Clarendon Press, Oxford, 1991, xx+294 pp., $23\frac{1}{2}$ cm. Price $59.95 hardcover, $29.95 paperback.

The REDUCE Computer Algebra system has a long history of wide distribution on a variety of computers. Its international community continues to use and improve the program, under the coordination of its original author, A. C. Hearn at the RAND Corp.

This text, which is based on a series of lectures on REDUCE delivered in 1989, targets an audience of persons who need more information than is readily available from the REDUCE manual and the source code for the system.

The authors provide authoritative and substantial additional background, commentary, and examples of usage and programming using REDUCE data types and commands. The authors' concerns range from the mundane (e.g., the differences between the ATARI ST version and other systems) to deep mathematical issues (at least briefly, the algorithms for polynomial factoring and indefinite integration are discussed).