33[39A05, 44A12, 65T10, 94A12]—*The DFT: An owner's manual for the discrete Fourier transform*, by William L. Briggs and Van Emden Henson, SIAM, Philadelphia, PA, 1995, xvi+434 pp., $25\frac{1}{2}$ cm, softcover, $37.50

This is an enormously useful handbook on the discrete Fourier transform (DFT) written for scientists, engineers, and applied mathematicians. It starts with a few pages of historical and practical introduction and moves on to cover the theory and the computational aspects of the DFT and a sample of DFT applications. The authors succeed admirably in their ambitious aim to present a comprehensive treatment of many facets of the DFT.

Chapter 2 on various paths to the definition of the DFT and Chapter 3 on the basic properties of the DFT form the core of the book. The remaining seven chapters can be read more or less independently. Chapters 4 and 5 are devoted to symmetric DFTs and multidimensional DFTs, respectively. Chapter 6 discusses in great detail the pointwise and mean-square errors in the DFT, with the Poisson summation formula playing a central role in the analysis. An interesting selection of applications is presented in Chapter 7: difference equations, digital signal processing, seismic exploration, and image reconstruction in tomography. Transforms related to the DFT, such as the Laplace transform, the z-transform, the Chebyshev transform, and the Hartley transform, are treated in Chapter 8. The fundamental connections between the DFT and quadrature rules are explored in Chapter 9. The final chapter presents an overview of the fast Fourier transform. There is also a table of DFTs in an appendix, a bibliography of 166 items, and a very detailed index.

The authors have taken great care to give a lively and well-motivated account of the subject. There is a lot of illustrative material in the form of case studies, examples from applications, and numerical data. Each chapter concludes with a list of problems that ask for detailed proofs of theoretical results or computational work and sometimes offer an outlook on new territory. A welcome feature are the historical and biographical notes and remarks interspersed throughout the text. There are only very few irritating misprints: "Noble Prize" instead of "Nobel Prize" in the footnote on p. 45, and a sign error in the definition of the DFT on the inside front and back covers. The book can be strongly recommended both as a reference work for practitioners and as an introductory textbook.

H.N.

34[65-00, 65-04]—*A numerical library in C for scientists and engineers*, by H. T. Lau, CRC Press, Boca Raton, FL, 1995, xviii+795 pp., 26 cm, $69.95

During 1974–78 Dutch numerical mathematicians cooperated in building the so-called NUMAL library (NUMerical procedures in ALgol 60), a systematically arranged collection of over 400 numerical modules. The project was coordinated by the Mathematical Centre, Amsterdam. The library contained older collections of numerical algebra procedures developed in the sixties and was completed with results of current research and implementations of algorithms that were publicly available. With the publication (by the Mathematical Centre) of the whole NUMAL manual in their book series in 1981, the project practically ended, as the world was

turning its back on Algol 60, and the interest in maintaining this library was rapidly waning. What remains fifteen years later is this manual printed from one-alphabet lineprinter output, and it does not at all look palatable now.

The book under review is the manual of a straightforward conversion of the complete NUMAL library into C. The book contains a diskette with all source code of routines and example programs.

Nearly all NUMAL procedures and their example programs have been converted into ANSI C, and all routine descriptions (purpose of the routine, specification of the parameters, information about the solution method) are now meeting modern standards of typesetting and readability. Owing to the availability of typesetting for mathematical formulas, the descriptions of purpose and method of many routines could actually be supplemented with further explanations that were (for NUMAL) only available in the referenced literature. The typesetting and rewriting of formulas is not perfect and errors occur (which probably do not trouble the reader much), but is a big improvement compared with the NUMAL manual. There is no new extension, algorithms have not been replaced or modified reflecting recent achievements, and the choice of parameters is still the choice that was found useful when employing Algol 60. C utilities are used for imitating the Algol dynamic memory management.

It is difficult to assess the usefulness of this work. One could say that the work was hardly called for, and the programming style in use for Algol 60 procedures twenty years ago by some contributors of the NUMAL library is probably not adhered by them any more. Experienced C programmers might find that the Algol 60 style of making and using arrays is error prone when applied to C implementations. What (relative) merits does this collection have compared with the set of routines known as Numerical Recipes, or compared with well-known libraries for which efforts are continuing to improve methods, the performance on new architectures, the ease of use for users that do not have a PhD in numerical analysis, and the attractive presentation of the computed results?

As can be perceived from the Introduction, the author appreciates the NUMAL-like setup of a library with very technical routines and accessible auxiliaries because of its possibilities for developing new research software using the library modules as building blocks. Also, students could be entertained with assignments to modify example programs in order to provoke some listed error exit of a routine, or they could learn by studying the implementations. This justification for the book is not very pretentious. However, the book is also a tribute to a group of pioneers in numerical software.

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35[01A70, 33-XX, 33C45, 41-XX, 41A55]—*Approximation and Computation: A festschrift in honor of Walter Gautschi*, R. V. M. Zahar (Editor), International Series of Numerical Mathematics, Vol. 119, Birkhäuser, Boston, 1994, xlvi+591 pp., 24 cm, $98.00

Nearly twelve months after the actual event, an International Symposium was held at Purdue University in December 1993 to celebrate the 65th birthday of