

Heath, Michael T.

Scientific computing: an introductory survey. (English) Zbl 0903.68072
New York, NY: McGraw-Hill. xx, 408 p. (1996).

Scientific computing is part of what has become known as computational science. As construed in the book, scientific computing is primarily concerned with the following phases of computational science: development, implementation, and use of numerical algorithm and software. The book presents a broad overview of numerical methods and software to solve mathematical problems. It is aimed much more at potential users of mathematical software than at potential creators of such software. The prerequisites for the book have been kept to a minimum: basic familiarity with linear algebra, multivariate calculus, and a smattering of differential equations.

The book does not provide any software, nor does it concentrate on any specific software packages, libraries, or environments. Instead, for each problem category pointers are provided to specific routines available from publicly accessible repositories, other textbooks, and the major commercial libraries and packages.

Each chapter of the book covers a major computational problem area. The first half of the book deals primarily with algebraic problems such as systems of linear equations, linear least squares, eigenvalues and singular values, nonlinear equations, whereas the second half of the book treats analytic problems involving derivatives and integrals.

Almost every concept and method introduced is illustrated by one or more examples. The lists of available software for each problem category are meant to be reasonably comprehensive. The last but one section of each chapter deals with the available software for the given problems. All of the recommended software is at least competently written, and some of it is superb – by the author.

The last section of each chapter contains Historical Notes and Further Reading. At the end of each chapter one finds Review questions, Exercises, and Computer problems. Review questions are short-answer questions designed to test basic conceptual understanding, Exercises require somewhat more thought, longer answers and possibly some hand computation, Computational problems require some programming and often involve the use of existing software. Although numerous concrete applications appear in the exercises, the main discussion treats each major problem type in a very general form.

After Preface and Notion, 13 chapters treat of major problem types, and Bibliography and Index close the book.

Reviewer: [Jozsef Tankó \(Budapest\)](#)

MSC:

- [68-01](#) Introductory exposition (textbooks, tutorial papers, etc.) pertaining to computer science
- [65-01](#) Introductory exposition (textbooks, tutorial papers, etc.) pertaining to numerical analysis

Cited in 1 Review Cited in 55 Documents
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Keywords:

[scientific computing](#)