E. I.

100[X].—M. V. Wilkes, F.R.S., *A Short Introduction to Numerical Analysis*, Cambridge University Press, Cambridge, England, 1966, 76 pp., 22 cm. Price $4.75.

As the title indicates, this is a very short (76 pp.) introduction to numerical analysis. It is also reasonably priced, with a paper bound edition available for $1.95 from Cambridge University Press. The author covers the usual topics treated in a first course in numerical analysis. These include iteration, interpolation, numerical integration and differentiation, the solution of ordinary differential equations, and the solution of linear systems. The level of the material is fairly elementary, although the author does not hesitate to use advanced concepts to simplify derivations. The emphasis is on methods rather than proofs.

The chapter on Interpolation is by far the longest chapter, and, considering the length of the book, by far too long, especially since many important concepts and methods are omitted.

This book has some value as a quick reference book. As a textbook it is of questionable value. The brevity of the material, the omission of proofs and the general lack of cohesion make it, in the referee's opinion, unsatisfactory even for an undergraduate course in numerical analysis.

Samuel D. Conte

Purdue University
Lafayette, Indiana

101[X, Z].—T. E. Hull, *Introduction to Computing*, Prentice-Hall, Inc., Englewood Cliffs, N. J., 1966, xi + 212 pp., 24 cm. Price $6.95.

This text is divided into three main parts of five chapters each: first, a discussion of the basic properties of computers and of simple algorithms using machine-language code for a hypothetical computer; the second five chapters are a thorough standard introduction to the Fortran language (based on the Fortran IV compiler under IBSYS on the IBM 7090/94 and 7040/44); the final five chapters cover elementary programming techniques and automata theory.

The title of the book would more properly be that of a beginning course, since the text is not intended to provide comprehensive coverage of many topics. Thus the chapters on Numerical and Non-Numerical Methods and on Simulation actually discuss the computational implications of a few simple examples rather than the subjects themselves. A valuable feature of the text is its attempt to indicate what is implied in terms of actual machine operations by the writing of certain Fortran statements. Because the hypothetical machine code discussed is not for the computers on which the Fortran language is implemented, this technique finds only limited application in the chapters on Fortran.

JOHN EHRMAN

Stanford Linear Accelerator Center
Stanford University
Stanford, California

102[Z].—JOHN VON NEUMANN, *Theory of Self-Reproducing Automata*, Edited and completed by Arthur W. Burks, University of Illinois Press, Urbana, Illinois, 1966, xix + 388 pp., 24 cm. Price $10.00.

This volume consists of a meticulously edited version of a series of five lectures on basic computer theory given by von Neumann at the University of Illinois in December 1949, together with an extensive but unfinished manuscript on computer self-reproduction written by von Neumann in 1952–1953. The Illinois lectures are particularly interesting for von Neumann's digressions on the future and general significance of computers as seen by him in 1949. Some of his comments on the problem of complexity are still highly apropos, perhaps more in connection with software than with hardware.

The manuscript forming the second part of the book is a good example of von Neumann's very brilliant mathematical style, but is perhaps somewhat disappointing in the result which it presents. Consider an infinite set of small Turing machines, all but one initially in a wait state and with blank tapes, and each capable of writing onto the tape of its neighbors and of putting its neighbors into an initial active state. It is then reasonably clear that by copying its own tape onto the tape of one of its neighbors and starting this neighbor, a Turing machine is able to initiate a process of self-reproduction of a suitable given set of tapes. Von Neumann's paper expands upon this observation, showing by explicit construction that both the basic Turing machines and their tapes can be simulated in a hypothetical crystal medium, each of whose points is an elementary 29-state automaton.

The editor provides a well-written and instructive historical account of von Neumann's work with computers.

JACOB T. SCHWARTZ

Courant Institute of Mathematical Sciences
New York University
New York, New York 10012

103[Z].—JAGJIT SINGH, *Great Ideas in Information Theory, Language and Cyber-*