100[X].—EDWARD L. STIEFEL, *An Introduction to Numerical Mathematics*, Academic Press, Inc., New York, 1963, x + 286 p., 24 cm. Price $6.75.

This book tends to treat many of the newer aspects of computing to the neglect of a balanced presentation such as is apt to be required in American schools where the beginner is almost totally ignorant of all of computing. The author also tends to give an algorithmic approach to many topics to the exclusion of "why." Since he seldom tells the reader where he is going, the reader is apt not to know where he has been when he reaches the end of a section.

Among the better points of the book is the treatment of simultaneous linear algebraic equations so that linear programming fits neatly into the scheme. He follows this with some game theory, but, as is often the case, the treatment is so rapid and scanty that the student is not likely to retain much.

The author is clearly oriented towards the treatment of each individual problem and away from the mass production of many answers to many problems (which can, of course, be dangerous but is a fact of life, nevertheless). Finally, the author makes a number of small slips which reveal that he was occasionally "nodding" when he wrote the book, especially when it comes to the treatment and effect of roundoff errors.

All in all, however, it is an interesting book and one that many experts could profit from reading.

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101[Z].—MICHAEL A. ARBIB, *Brains, Machines, and Mathematics*, McGraw-Hill Book Co., New York, 1964, xiv + 152 p., 20 cm. Price $6.95.

This book is intended to be a readable introduction to the relatively new and fashionable subject of modeling of mental or nerve activity by mathematical or machine systems. Rather than trying to say a little about every aspect of this rather sprawling subject, the author has chosen to go fairly deeply into one particularly nice piece of work in each of several areas, with passing mention of a few others. Mathematics, in the form of finite automata theory and computability theory, gets some fifty pages, with communication theory and related work on reliable structures taking up another thirty. The remainder of the book is devoted to a summary of the work of Lettvin and others on the visual system of the frog, the vaguely similar Perceptron, and a brief discussion of Cybernetics. The book has, in fact, a good bit of the flavor of a collection of research papers, since many of the sections follow some standard presentation quite closely, though usually with a good bit of compression obtained by omission of detail and some reduction in generality. These omissions are usually well indicated, and the interested reader is referred to one or more sources for a fuller treatment. A particularly pleasant feature is the presence of frequent comments pointing out the often gross approximations involved in associating the various models with actual neurological structures, and making explicit the assumptions which have been made and the limitations which they imply.

One can, of course, quarrel with some of the choices in emphasis that have been made. In particular, the form of Gödel's Theorem which is given (and proved) claims only the incompleteness of an "adequate, ω-consistent logic," without any indication that in any such logic an undecidable sentence can be effectively found, or that the hypothesis of ω-consistency can be reduced to simple consistency. These features, along with the proof, evidently resulted from a condensation of the discussion in Davis [1], where the creativity of the set of theorems of an adequate logic is discussed, but not emphasized.

In summary, this book can be recommended as an exploration in depth of a selection of the more scientifically respectable attempts at constructing models of the brain, laced together with enough commentary and indication of context to give the reader a reasonably fair notion of what has been done.

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1. Martin Davis, *Computability and Unsolvability*, McGraw-Hill Book Co., Inc., New York, 1958.

102[Z].—F. J. Corbato, J. W. Poduska & J. H. Salzer, *Advanced Computer Programming*, M. I. T. Press, Cambridge, Massachusetts, 1963, vi + 192 p., 29 cm. Price $5.00.

In contrast to most of the books on digital computer programming which have been published (in increasing numbers) in the last two or three years, this short text deals exclusively with systems programming. It does this very competently by setting up a prototype system, called Classroom Assembly Program (CAP), and showing how to design an assembler and compiler to translate from CAP language to machine language. The translator program is described in the FAP language of the IBM 7090. The reader is assumed to be sufficiently familiar with FAP so that he can understand the IBM reference manuals on FAP and the 7090 without guidance from the present text. In particular, he is supposed to be familiar with the Binary Symbolic Subroutine (BSS) linkage and relocation techniques used in the IBM Fortran Monitor System, as described in the FAP Reference Manual (IBM Publication C28-6235, September 1962).

The text consists of five chapters and three appendices. The five chapters describe: (1) the CAP language (it is similar to FAP); (2) the CAP assembler (in general terms and using flow charts); (3) the CAP compiler (e.g., what does a compiler do?; precedence of operations; temporary storage); and finally (4) an execution-monitor system which allows the student to perform laboratory exercises on CAP (e.g., modifications and additions suggested in Appendix C).

Appendix A contains a FAP listing of the assembler-compiler program of CAP. Appendix B contains a FAP listing of the execution-monitor program.

Although the authors have based their exposition on a particular programming system, they succeed in explaining many of the general ideas and problems underlying the design of assemblers and compilers. The text is a useful addition to the literature on programming technology.

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