

There are four chapters and five appendices, the titles of which (translated into English) are: I, "The exact number of primes less than a given limit." II, "The approximate number of primes." III, "How to identify large primes." IV, "Factorization." 1, "Some algebraic theorems." 2, "Some number theoretic theorems." 3, "Quadratic residues." 4, "Arithmetic of quadratic fields." 5, "Algebraic factors of  $a^n \pm b^n$ ."

Chapter I deals in such topics as Meissel's formula and Lehmer's formula. Chapter II discusses distribution questions: the Gauss, Legendre, and Riemann approximations; the remainder term in the prime number theorem; twins, large gaps, etc. The last two chapters are concerned with primality tests and factorization methods. The appendices have background material.

There are 12 extensive tables.

1. All primes  $p < 10^4$ .
2. All primes  $10^n < p < 10^n + 1000$  for  $n = 4(1)15$ .
3.  $\pi(x)$  and the Gauss and Riemann approximations to  $x = 10^{10}$ .
4. Composites  $104395289 < c < 2 \cdot 10^8$ , satisfying  $2^{c-1} \equiv 1 \pmod{c}$  and having no prime divisor  $\leq 317$ .
5. Known factors of Fermat numbers.
6. Complete factorization of  $2^n - 1$ . All  $n < 137$  and others  $\leq 540$ .
7. Factors of  $(10^n - 1)/9$  and  $10^n + 1$ .
8. Primes of form  $h \cdot 2^n + 1$  for  $h = 1(2)99$ . [Note,  $h = 1, n = 8$  is missing.]
9. Primes of form  $h \cdot 2^n - 1$  for  $h = 1(2)151$ .
10. Primes of form  $n^4 + 1$  for  $n \leq 4002$ .
11. Miscellaneous.
12. Quadratic residues: for square-free  $a$ ,  $|a| < 100$ , all  $k$  and  $l$  such that primes  $p = kx + l$  have  $(a | p) = +1$ .

An English translation may be published in the future, but even readers with no Swedish will be able to grasp much of the present text. Try this:

SATS B1.3 Om  $A$  är element i en ändlig grupp  $G$  med  $n$  element,  
 är  $A^n = I$ .

The tables are in Arabic numerals and will cause no difficulty at all.

D. S.

9[10].—JOHN LEECH, Editor, *Computational Problems in Abstract Algebra*, Pergamon Press, Ltd., Oxford, 1970, x + 402 pp., 23 cm. Price \$18.50.

This book consists of thirty-five papers, most of which were presented at a conference on the use of computers in solving problems in algebra, held in 1967 at the University of Oxford under the auspices of the Science Research Council Atlas Computer Laboratory.

Over one-half of the papers are concerned with the application of computers to problems in group theory. The balance of the book includes papers on the use of computers in such areas as word problems in universal algebras, nonassociative algebras, latin squares, Galois theory, knot theory, algebraic number theory, algebraic topology and linear algebra. The first paper, a survey of the methods used and the

results obtained by computers in the investigation of groups, contains an extensive bibliography on applications of computers to problems in algebra.

Many of the leading experts in the use of computers in algebra are among the authors of these papers, and the book gives a fairly comprehensive picture of the quite diverse activity in the subject.

The number of available papers concerning applications of computers to problems in algebra is relatively meager considering the potential of such applications. This volume is a welcome and a significant addition to the literature on the subject.

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10[12].—R. D. PARSLow, R. W. PROwSE & R. E. GREEN, Editors, *Computer Graphics: Techniques and Applications*, Plenum Press, London and New York, 1969, xiv + 247 pp., 23 cm. Price \$16.00.

This book consists primarily of a collection of papers that were presented at the International Computer Graphics Symposium held in July 1969 at Brunel University, Uxbridge, England. The book, which was designed to cover the field of computer graphics, is organized into four parts.

Part 1 contains nine papers that deal with basic hardware/software concepts in computer graphics. This section of the book is intended to serve as an introduction to the field for the novice; unfortunately, only the first paper, "What has Computer Graphics to Offer?", is suitable for this purpose.

The paper "Computer Graphics Hardware Techniques," although well written, suffers from a lack of visual aids to guide the novice. The companion paper "Computer Graphics Software Techniques" provides a rather sketchy coverage of its subject matter. The highlight of this paper is an extremely good treatment of the concept of a graphic data structure and its relationship to a display file. A third techniques-oriented paper, "Interactive Software Techniques," suffers because of poor organization.

The paper entitled "Computer Display System Tradeoffs" provides an interesting discussion of the relative merits of the so-called buffered display, which contains its own refresh memory, and a display which uses the computer memory as the refresh memory. This discussion concentrates on the hardware aspects of the question and ignores the software considerations. This paper, although well written, may be lost on the novice.

The two papers "Computer Graphics in the United States" and "The U. K. Scene" are intended to provide an overview of computer graphics in the United States and in England. The poor presentation in the second paper is in very striking contrast to the better organized presentation in the first.

The paper "Low Cost Graphics" provides a very good coverage of the tradeoffs inherent in the three most commonly used types of CRT displays; random-scan refresh, sequential-scan refresh, and the direct-view storage tube (DVST). A strong case was made for the use of the DVST in those applications which are not highly interactive.