matrix printer and is readable, but certainly not elegant. In compensation, the tables are very easy to use, since the spiral binding allows the pages to lie flat.

The tables also give $N(p)$, the number of positive non-residues $<\frac{1}{2}p$. In the introduction it is pointed out that for primes of the form $4m + 3$ we have

$$[\tfrac{1}{2}(p - 1)]! \equiv (-1)^{N(p)} \pmod p.$$

It is also indicated that for all such primes (but we must add >3) the class number, $h(-p)$, is given by

$$h(-p) = -\frac{1}{p}\sum_{a=1}^{p-1}\left(\frac{a}{p}\right)a.$$

The much more easily computed formula [1],

$$h(-p) = \frac{p - 1 - 4N(p)}{4 - 2\,(2/p)},$$

is not mentioned. The introduction also states that it can be "found" in the table that $N(p) = m$ for all primes of the form $4m + 1$. But surely one does not need the table to be convinced of this simple theorem. The quantity which is really useful for those primes is $2\sum_{a=1}^{m}(a/p)$, and not the redundant $N(p)$.

D. S.

1. E. LANDAU, *Aus der elementaren Zahlentheorie*, Chelsea Publishing Co., New York, 1946, p. 128.

36[G X].—V. N. FADDEEVA, *Computational Methods of Linear Algebra*, Translated by Curtis D. Benster, Dover Publications, Inc., New York, 1959, x + 252 p., 21 cm. Price $1.95.

The first chapter of this book forms a clear and well-written introduction to the elementary parts of linear algebra. The second chapter deals with numerical methods for the solution of systems of linear equations and the inversion of matrices, and the third with methods for computing characteristic roots and vectors of a matrix. Most of the important material in these domains is to be found here, and many numerical examples which illustrate the algorithms and point out their merits and deficiencies are given.

The discussion is directed principally to the hand computer, and machine computation in the modern sense is hardly present, but the book must be regarded as a valuable guide for the worker in the general area of linear computation.

MORRIS NEWMAN

National Bureau of Standards
Washington 25, D. C.

37[G, X].—M. MIDHAT J. GAZALÉ, *Les Structures de Commutation à m Valeurs et Les Calculatrices Numériques*, Collection de Logique Mathématique, Série A, Monographies Réunies par Mme. P. Fevrier, Gauthier-Villars, Paris, 1959, 78 p., 24 cm. Price 16 NF.

The theme of this pamphlet is sets of operations which are complete in the sense that "conjunction" and "negation" (or "exclusive or," "conjunction" and "1," or the "Sheffer stroke") are complete. By an operation we mean a (single-valued) function whose domain is S^n for some set S and positive integer n. A set F of operations on S is complete if any operation f on S (of any number of arguments) can be constructed from F by composition (substitution) and identification of variables.

The first three chapters, which are introductory, include, among other things, a discussion of how constructing f from F corresponds to constructing a network "realizing" f from elements (primitive networks) which realize the elements of F. Chapter IV is preparatory to Chapter V, where the first significant theorem appears. This is to the effect that sum modulo p (p a prime), product modulo p, and the constant functions are complete. Alternatively, every n-ary operation on $0, 1, 2, \cdots, p - 1$ is representable by a polynomial in n variables over the field of integers, modulo p. The author fails to note, however, that for any finite field, any operation on the p^n field elements is representable by a polynomial over the field. As a matter of fact, essentially the same argument the author gives for p elements is applicable to the more general situation.

Chapter VI deals with a theorem of Webb to the effect that the binary operation W defined over $0, 1, \cdots, m - 1$ by $W(x, y) = 0$ if $x \neq y$ and by $W(x, y) = x + 1$, mod m, if $x = y$ is complete. The author gives a formulation of the theorem which does not make use of the additive structure on the set, and gives a proof of it.

The last chapter (VII) generalizes a theorem of E. L. Post to the effect that if R is a permutation of E, the integers mod m, then the pair of operations $\otimes_R$, P_R is complete, where $R(i) \otimes_R R(j) = R$ (min i, j) and $P_R(R(i)) = R(i + 1)$, for all $i, j \varepsilon E$.

The following misprints were discovered:
p. 39 line 10, $E = (0, 1 \cdots, n - 1)$ *should read* $E = (0, 1, \cdots, p - 1)$;
p. 40 (63), *read* A_{rq} *for* Arq;
p. 40 line 6 from bottom, *read* M_{rt} *for* Mrt;
p. 51 line 2 from bottom, *read* p^n terms *for* p terms;
p. 55, 56; each recurrence of *bg* *should read* b_g ;
p. 59 last line, $a = \delta ab$ *should read* $q = \delta ab$.

CALVIN C. ELGOT

IBM Research Center
Yorktown Heights, New York

38[I].—A. O. GELFOND, *Differenzenrechnung*, Deutscher Verlag, Berlin, 1958, viii + 336 p., 23 cm. Price DM 40.

This is a translation of the Russian edition (1952) which is a revised and extended version of an earlier book (1936). It is mainly concerned with problems in the complex domain, and some material, traditional in courses on Finite Differences, is omitted. The techniques used are those of classical analysis. There are occasional sets of problems, and some very interesting worked examples.

The book is divided into three large chapters (1, 2, 5) and two smaller ones (3, 4). Chapter One deals with the problem of interpolation ("construct an (ap-