34[D, E, L, S, X].—Nelson A. Logan, *General Research in Diffraction Theory*, Volumes I and II, Missiles and Space Division, Lockheed Aircraft Corp., Sunnyvale, California. Reports LMSD-288087 and LMSD-288088, December 1959, xxiii + 345 p. and xviii + 268 p., 28 cm. Deposited in UMT File.

Volume I consists of a study of the theory and applications of a class of integrals defined by

$$A_m^n(\xi) = \sum_{s=1}^{\infty} \alpha_s^n [Ai'(-\alpha_s)]^{-m} e^{-(\sqrt{3}-i)\alpha_s \xi/2},$$

$$B_m^n(\xi) = \sum_{s=1}^{\infty} \beta_s^{n-1} [Ai(-\beta_s)]^{-m} e^{-(\sqrt{3}-i)\beta_s \xi/2}$$

where α_s, β_s denote the roots defined by $Ai(-\alpha_s) = 0$, $Ai'(-\beta_s) = 0$, and $Ai'(-\alpha_s)$, $Ai(-\beta_s)$ are the turning values of the Airy integral. This representation is useful only for $\xi > 0$. Alternative representations useful for $\xi \to 0$ are developed for the case A_0^n and B_0^n. For $m = 1$ the functions are entire functions of ξ, and tables are given for the coefficients of the Taylor series of A_1^n and B_1^n. These coefficients are evaluated by using the Euler summation scheme to sum the divergent series obtained by setting $\xi = 0$, $m = 1$ in the above representations. When $m = 2$ it is necessary to extract some terms which are singular at $\xi = 0$. The remaining parts of A_2^n and B_2^n are shown to be entire functions. Tables for the coefficients in the Taylor series for these non-singular parts are found by using the Euler-Maclaurin summation formula to sum the divergent series which are obtained by setting $\xi = 0$, $m = 2$ in the above representations. For $\xi \to -\infty$, asymptotic expansions are obtained for the cases $m = 1$ and $m = 2$. Tables are given for the coefficients in these expansions.

Volume II consists of a set of 26 tables and 17 figures that provide a supplement to the theoretical analysis contained in Volume I. Tables A, B, and C contain special tables of exponential and trigonometric functions which will facilitate computation with residue series and asymptotic expansions of the diffraction integrals. The functions tabulated in the remaining tables can be used to study diffraction effects when (a) source and receiver are on the surface, (b) source (or receiver) is on the surface and the receiver (or source) is at a great distance, and (c) both source and receiver are at a great distance.

Author's Summary

35[F].—R. Kortum & G. McNiel, *A Table of Quadratic Residues for all Primes less than 2350*, LMSD 703111, October 1960, Lockheed Missiles and Space Division, Sunnyvale, California, iii + 3 + 378 unnumbered pages, 28 cm.

This large report, bound with a plastic spiral, lists all 187,255 quadratic residues of the 347 primes from 3 to 2347. The tables were computed on an IBM 7090 in about ten minutes. Presumably most of this time was spent in binary-decimal conversion and in writing on tape. The original printing was done on a high-speed, wire 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.

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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