Chapter 7 treats certain special kinds of linear transformations and matrices: scalar, diagonal, triangular, symmetric, elementary, and orthogonal.

Chapter 8 includes bilinear forms, quadratic forms, the equivalence of quadratic forms, congruence of matrices, and the geometric interpretation and application of these forms.

Chapter 9 is entitled "Complex Number Field, Polynomial Rings." The authors dispose of complex numbers in one section and then give a proof of the fact that the complex numbers are essentially the only 2-dimensional division algebra over the real field. The remainder of the chapter is concerned with elementary theory of equations. Polynomials are introduced in the first instance as infinite-tuples with a finite number of non-zero entries.

Chapter 10 deals with characteristic fields and vectors. The idea of canonical forms is introduced; and these are derived in the case of linear transformations for which the characteristic vectors generate the whole vector space. The orthogonal reduction of symmetric matrices is given; and quadratic forms are reduced to their standard forms. In the last section of this chapter the authors show how the results for orthogonal and symmetric matrices can be extended to similar results for unitary and Hermitian matrices.

In the last chapter, entitled "Similarity of Matrices," the rational and classical canonical forms of a linear transformation T are derived by writing the vector space as a direct sum of cyclic subspaces relative to T.

The book is carefully written and well motivated. At every turn the authors are concerned to keep the reader informed of what they are doing, what they are planning to do, and why. There is a good selection of exercises which should prove interesting and stimulating to the student. This book should prove to be very satisfactory, both as an introductory classroom text in linear algebra and as a guide for the student who wishes to study the subject on his own.

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Tables of Weber Functions, Volume 1, by I. Ye Kireyeva and K.A. Karpov. Mathematical Table Series volume 15. Pergamon Press, Oxford, London, New York, Paris, 1961. xxiv + 364 pages. $20.00.

Weber's parabolic cylinder function, $D_p(z)$, is a solution of Weber's differential equation

$$y'' + (p + \tfrac{1}{2} - \tfrac{1}{4} z^2) y = 0.$$

It occurs in quantum mechanics, electromagnetic wave propagation theory, aerodynamics, and other branches of applied mathematics; and it is useful also for the asymptotic representation of solutions of a differential equation containing a large parameter in the event that the equation has a transition point of order two, or two simple transition points.

The only previously existing extensive tables of this function are due to J. C. P. Miller [Tables of Weber parabolic cylinder functions, H. M. Stationary Office, London, 1955] who tabulated

$$W(a, x) = D_{-\frac{1}{2} + ia}(xe^{i\pi/4})$$

for $x = -10(0.1)10$ and $a = -10(1)10$. Miller's tables have been extended recently by L. Fox [Tables of Weber parabolic cylinder functions and other functions for large arguments, National Physical Laboratory Mathematical Tables volume 4, H. M. Stationary Office, London, 1960] who tabulated certain auxiliary functions for $z = x^{-1} = -0.1(0.005)0.1$ and $a = -10(1)10$. The tables by Miller and Fox provide a good coverage on the continuous spectrum where $p + \frac{1}{2}$ is imaginary.

The present volume complements the available tables by tabulating (the real and imaginary parts of) $D_p(x(1+i))$ for real p. The variable x varies from -10 to 10 in steps of 0.01; the parameter p takes values from 0 to 2 in steps of 0.1 for $|x| \leq 5$, and in steps of 0.05 for $5 \leq |x| \leq 10$. Five or six decimal places of the functional values are given, and the error in the tabulated values is stated not to exceed 0.6 of a unit of the fifth decimal place. The tables were computed on a "Strela" computer at the Computing Centre of the Academy of Sciences of the U. S. S. R.

The Introduction contains a useful collection of formulas, graphs of some of the tabulated functions, relief diagrams covering almost the entire range of tabulation, a description of the computation of the tables, and instructions for use of the tables, interpolation, and extension of the tables. For computation with $|x| > 10$ asymptotic formulas are given whose coefficients are also tabulated. Likewise auxiliary tables are included to facilitate the computation of solutions of Weber's differential equation with arbitrary initial conditions. A useful folding insert enables the user to locate quickly any given range of x and p in the table and contains diagrammatical information about interpolation, giving the number of points to be used in Lagrange's formula to obtain full accuracy.

All in all, this is a well-arranged and very useful set of tables.

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The only blemish in the English edition is the translation of the Introduction which, if always understandable, is occasionally ungrammatical and employs non-standard terminology. For instance, the well known recurrence relations for parabolic cylinder functions are called recurrent correlations on p. x while they are called recurrent formulae on p. xxi; confluent hypergeometric functions are called degenerate hypergeometric functions (a term commonly used for certain exceptional, rather than limiting, cases of Gauss' hypergeometric series). Apart from these imperfections, the English edition is beautifully produced and does credit to the publishers and their printers.

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Works of J. Willard Gibbs. Dover Publications, New York, 1961.

Dover Publications has republished the complete works of America's most distinguished scientist, J. Willard Gibbs. Available for the first time in paperback editions are The Scientific Papers of J. Willard Gibbs in two volumes ($2.00 each volume, 434 and 284 pages), Vector Analysis, prepared by Edwin Bidwell Wilson from Gibbs' pioneering lectures ($2.00, 436 pages), and Gibbs' Elementary Principles in Statistical Mechanics ($1.45, 207 pages).

J. Willard Gibbs (1839-1903) was the foremost American mathematical physicist of his day. Although he is known primarily for his formulation of the Phase Rule, he made important contributions to dynamics, mathematics, and optics as well as to thermodynamics. The Scientific Papers of J. Willard Gibbs brings together all these contributions in their original form: 30 papers, monographs and abstracts.

Although the Vector Analysis lectures were given nearly 60 years ago, Edwin Bidwell Wilson's textbook remains a first-rate introduction and supplementary text for students of mathematics and physics. This book is elementary enough to be followed by anyone who has had some calculus.

Elementary Principles in Statistical Mechanics is Gibbs' last work. In it, Gibbs undertook what was probably the first independent development of statistical mechanics. Still a fundamental treatise on the subject, it brings together the achievements of Clausius, Maxwell, Boltzmann, and Gibbs himself.

(Publisher's Introduction)