the typical reader will need the equivalent of a master's degree in mathematics, and preferably more. This is partly because the material is fairly difficult in itself, but partly because the theoretical exposition is not lucid. The author goes from topic to topic with few signposts to help the reader, and none for the scanner. Although there are many derivations and proofs, results are nowhere summarized as theorems. The reviewer found much of the theory hard going, and occasionally suspected the author of formal manipulation without any justification within the reader's presumed knowledge (for example, in replacing a polynomial in a scalar by a polynomial in a matrix in equation (2.06.5) and after (4.0.7)).

The publishers have done a fine job in preparing the book. The few misprints noted were minor. The equation numbers might well have been simplified; why have (2.1322.5) or (2.201.10)?

In summary, the reviewer considers the book as a first definitive treatise on the subject matter and spirit of modern numerical analysis. As such, it is unique in a new area, and gives background, essential ideas, and references for a great number of methods never before brought together in a book. It is oriented toward the exploitation of automatic digital computers. While hard to read in spots, it will be a welcome addition to the library of every one interested in digital computation.

GEORGE E. FORSYTHE

Tables of integral transforms. Prepared under the direction of A. Erdélyi. New York, McGraw-Hill, 1954. 20+391 pp. $7.50.

This is the fourth of a series of five volumes prepared in part from notes left by the late Harry Bateman. The first three are entitled *Higher transcendental functions* and are devoted to a description of the properties of such functions; the volume under review together with a fifth to follow form a table of integrals involving such functions and intended as "companions and sequel" to the first three. The whole work is dedicated to the memory of Harry Bateman, and was prepared under the direction of A. Erdélyi with the collaboration of Research Associates: W. Magnus, F. Oberhettinger, F. G. Tricomi; Research Assistants: D. Bertin, W. B. Fulks, A. R. Harvey, D. L. Thomsen, M. A. Weber, E. L. Whitney; and Vari-typist, R. Stampfel. The project was performed at the California Institute of Technology, supported by a grant from the Office of Naval Research.

The integrals of the present volume are classified in seven chapters under the following types of transforms: Fourier cosine, Fourier sine, exponential Fourier, Laplace, inverse Laplace, Mellin, inverse Mellin.

Preceding Chapter I, there is a very brief introduction to the first three chapters, calling attention to the relations existing between the various types of transforms of the book and giving references to the more important treatises on Fourier transforms. Similar introductions to the Laplace tables and to the Mellin tables appear before Chapters IV and VI, respectively. Each chapter except the last begins with a short section of general transforms involving arbitrary functions, the material sometimes called the "grammar" of the transform. Then begins the "dictionary," or list of special functions and their images. This list is subdivided in a fixed order: algebraic, exponential, logarithmic, etc. This order refers to the function to be transformed appearing in the left-hand column of each page (the other column carries the image). Each entry appears in a ruled box which includes the range of validity and any special feature such as the need for Cauchy principal value. The general transform under discussion appears at the top of each page. In a few cases where the image seems too complicated to print in the appropriate box a reference to the literature is given instead. Infrequently a statement like the following appears in the body of the tables: "For similar integrals see Titchmarsh, E. C. . . ." *Ad hoc* notations are explained where they occur.

As an appendix there is a 22-page listing of definitions of special functions. Although notations for many of these functions have become standard, those for others remain confused in the literature, so that this is an indispensable part of the book. The user will also be grateful for an index to the appendix.

In the reviewer's opinion, this table represents an important addition to the existing tables of transforms. It may become one of the invaluable tools for the engineer or indeed for any worker in the field of integral transforms. Many analysts who have chafed under the notation of Campbell and Foster, an otherwise excellent table, will welcome the more familiar notation of this new table of Fourier transforms. Another welcome feature of the present volume is the inclusion of separate chapters for inverse transforms. This greatly improves the usefulness of the book, for without these chapters a given function might present itself in either of two columns, only the first of which is arranged "alphabetically." [Have you ever tried to discover in the Sunday *New York Times* whether your team won at football when you didn't know the name of the opposing college? Easy if your team won; hard otherwise!]

In several weeks of use, the reviewer has found only one misprint (definition of principal value on p. 367), but of course this is small guarantee against the existence of others. One mildly adverse criticism could be made on account of possible ambiguity in the use of the solidus. For example, in formula (50), p. 93, does $(1/2\pi)$ mean $1/(2\pi)$ or $(1/2)\pi$? Probably the latter, though the fact that "1" is printed at a higher level than "2π" might suggest the former. In (17), p. 31 the use of $\pi\beta^{-1}$ and $(\pi/\beta - ac/\beta)$ in the same formula makes one wonder what the guiding principle in the employment of the solidus should be.

D. V. WIDDER

Vorticity and the thermodynamic state in a gas flow. By C. Truesdell. (Memorial des Sciences Mathématiques, no. CXIX.) 4+53 pp. Paris, Gauthier-Villars, 1952.

In present-day researches on the flow of a gas, the vorticity has come to play an increasingly important role. It is only necessary to cite, for instance, the investigations on the motion of the earth's atmosphere which have stressed more and more the importance of the vertical component of the atmospheric vorticity. In his monograph, Professor Truesdell shows how closely connected is the vorticity with the thermodynamic variables such as the pressure, temperature, entropy, enthalpy, etc., of the gas. Gas flows are divided into two mutually exclusive classes: complex-laminar (Kelvin's complex-lamellar) in which the vorticity and velocity vectors are perpendicular; and Beltrami motions where they are parallel. Irrotational motion is a special case of complex-laminar flow. The properties of these flows are expressed in twenty-six theorems of a general type; for example, it is shown why and under what conditions a gas-flow may be instantaneously barotropic, or isentropic, or such that all the variables of state and the speed are constant upon each stream-line. As an illustration, Theorem 10 may be quoted, viz: "In an inviscid flow in continuous motion as an inert mixture devoid of heat flux, if the extraneous force be zero or normal to the velocity and if the pressure field be steady, then both the entropy and total enthalpy of each particle remain constant." The last ten pages of the text are devoted to "Prim gases" in which the density is a product of a function of the pressure and a function of the specific entropy. The reading of the monograph is much facilitated by the provision of an index of definitions and by an index of symbols.

This work will be an invaluable reference book to those already acquainted with hydrodynamics and gas dynamics. The beginner may however well ask: where in nature or in the laboratory do piezotropic fluids, Beltrami and Hamel flows, Prim gases, etc., occur? Am