13 [7, 13.15].—HERBERT SHIPLEY, *Standard Tables for Circular Curves*, Edwards Brothers, Inc., Ann Arbor, Mich., 1963 (second printing, November 1965), 736 pp., 24 cm. Price $24.00. (Obtainable from Curve Data, P.O. Box 542, Kingman, Arizona 86401.)

These voluminous tables, prepared specifically for the use of civil engineers, provide 8D approximations to five lengths (tangent, exsecant, arc, segment height, and chord) associated with the central angle in a circle of unit radius. In trigonometric notation the tabulated quantities are, respectively, $\tan(\Delta/2)$, $\sec(\Delta/2) - 1$, Δ in radians, $1 - \cos(\Delta/2)$, and $2 \sin(\Delta/2)$. The argument Δ assumes the values $0°(10'')120°$, which range, according to the author, suffices for all practical applications in civil engineering. For each tabulated quantity, average first differences are provided at intervals of $1'$ in the argument. There is appended a 10-page conversion table which gives 8D equivalents in degrees of angles to 1° expressed in minutes and seconds.

The underlying calculations were performed to 9D on a UNIVAC system, and the results were then rounded to 8D for printing. The retention of only a single guard figure has naturally led to a relatively large number of rounding errors; none, however, is as large as two final units, so far as this reviewer could ascertain from a comparison of several hundred entries with corresponding data derived from Peters' definitive 8D tables [1].

Photo-offset printing of these tables from edited computer output has resulted in nonuniform typographic quality; nevertheless, all the tabular entries seem to be legible.

Examination of the tabular literature [2] reveals that the tables under review exceed all others of their kind with respect to range, precision, and fineness of argument. They should be of significant value to practicing civil engineers and others requiring these specific data in a convenient compilation.

J. W. W.

1. J. PETERS, *Eight-Place Tables of Trigonometric Functions for Every Second of Arc*, Chelsea, New York, 1963. (See *Math. Comp.*, v. 18, 1964, p. 509, RMT 65.)
2. A. FLETCHER, J. C. P. MILLER, L. ROSENHEAD & L. J. COMRIE, *An Index of Mathematical Tables*, second edition, Addison-Wesley Publishing Co., Reading, Mass., 1962, v. 1, pp. 189–191.

14 [7, 13.15].—HERBERT SHIPLEY, *Areas of Curve Elements*, Edwards Brothers, Inc., Ann Arbor, Mich., 1962 (second printing, November 1965), 131 pp., 24 cm. Price $12.00. (Obtainable from Curve Data, P.O. Box 542, Kingman, Arizona 86401.)

This is a companion to the author's *Standard Tables for Circular Curves*, described in the preceding review. It gives 8D values (without differences) of the areas of six configurations determined by various combinations of radii, tangents, chords, and arcs associated with central angles in a circle of unit radius. As explicitly stated in the table headings, multiplication of the tabular entries by a proportionality factor R^2 yields the corresponding areas for a circle of radius R.

The tabular argument is the central angle, Δ, which assumes the values $0°(1')120°$. In trigonometrical notation the tabulated quantities are, respectively, $\tan(\Delta/2)$, $\frac{1}{2}\sin\Delta$, $\Delta/2$ in radians, $\tan(\Delta/2) - \Delta/2$, $\tan(\Delta/2) - \frac{1}{2}\sin\Delta$, and

$(\Delta - \sin \Delta)/2$. The main table is supplemented by an 8D conversion table of angles in minutes and seconds to degrees.

The same criticisms apply to this set of tables as apply to the other set by this author; namely, numerous rounding errors and partially indistinct figures, though still legible.

Despite these flaws, this compilation should prove especially useful to civil engineers (for whom it is mainly intended) because it is the most extensive of its kind.

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15 [7].—WILHELM MAGNUS, FRITZ OBERHETTINGER & RAJ PAL SONI, *Formulas and Theorems for the Special Functions of Mathematical Physics*, Springer-Verlag, New York, 1966, viii + 508 pp., 24 cm. Price $16.50.

This is a new and enlarged English edition of a previous work by the first two authors which appeared under the title *Formeln und Sätze für die Speziellen Funktionen der Mathematischen Physik*; see *MTAC*, v. 3, 1948, pp. 103–105, 368–369, 522–523. A great deal of the present edition did not appear in the earlier editions. As in the previous editions, there are no proofs. The style of references has been changed. These are restricted to books and monographs and are placed at the end of each pertinent chapter. On occasion, references to papers are given in the text following the associated results. The authors justify this change in that, 20 years ago, much of the material was scattered over numerous single contributions, while in recent times, much of the material has been included in books with quite extensive bibliographies.

The volume covers a vast amount of ground as evidenced by the description of its contents which follows. Chapter I is devoted to the gamma function and related functions. The hypergeometric function is the subject of Chapter II. Nearly all the results are for the ${}_2F_1$—the Gaussian hypergeometric function. Generalized hypergeometric series are touched upon in two pages. There are no results on Meijer's G-function and other generalizations of the ${}_2F_1$. Bessel functions and Legendre functions are detailed in Chapters III and IV respectively. Chapter V takes up orthogonal polynomials. Chapter VI presents the confluent hypergeometric function—the ${}_1F_1$, and Chapter VII deals with Whittaker functions which are also confluent hypergeometric functions. The next two chapters deal with special cases of confluent hypergeometric functions, namely, parabolic cylinder functions (Chapter VIII) and the incomplete gamma functions and related functions (Chapter IX). Chapter X presents elliptic integrals, theta functions and elliptic functions. Integral transforms is the subject of Chapter XI. Here examples are given for Fourier cosine, sine and exponential transforms, and the transforms associated with the names of Laplace, Mellin, Hankel, Lebedev, Mehler and Gauss. This chapter contains a section giving closed-form solutions for integral equations of the form $f(s) = \int_a^b K(s, t)y(t)dt$, where a and b are finite, and $K(s, t)$ has an integrable singularity in the range of integration. An appendix to the chapter gives representations of some elementary functions in the form of Fourier series, partial fractions and infinite products. Chapter XII deals with transformations of systems of coordinates and their application to numerous partial differential equations of mathematical physics. A list of special symbols is provided. There is also a list of