12 [7].—H. P. ROBINSON & ELINOR POTTER, *Mathematical Constants*, Report UCRL-20418, Lawrence Radiation Laboratory, University of California, Berkeley, California, March 1971, iii + 183 pp. Available from National Technical Information Service, Operations Division, Springfield, Virginia 22151. Price $3.00 (printed copy), $0.95 (microfiche).

The unique collection of miscellaneous mathematical constants comprising the body of this report has been arranged in four tables.

Table I consists of 2498 constants tabulated to 20D (with a few exceptions given to less precision) and arranged unconventionally in ascending magnitude of the decimal part of each number.

Table II consists mainly of 20D values of the positive irrational roots of 338 selected quadratic equations, such that the positive integral leading coefficient of each equation does not exceed 5 and the remaining two nonzero integral coefficients do not exceed 10 numerically. Interlarded among these roots are 126 constants that properly belong in Table I.

Table III lists a variety of characterizations of each of the first 1000 positive integers; for example, their binary and ternary representations, their factorizations, representations as sums of two and three squares and of a similar number of cubes, also as differences of squares and of cubes, as well as other representations, including linear combinations of factorials. The special symbols used in this table are defined in an introductory section on pp. 80–81.

Table IV consists of 260 sets of coefficients of the first 10 terms of the Maclaurin series of selected algebraic and transcendental functions and combinations thereof, which head each tableau. The leading coefficient of each series has been arbitrarily taken as unity, and the remaining coefficients are presented in both rational form and as 10D approximations.

The authors explain in their introduction that the unusual arrangement of data in Tables I and II accomplishes a twofold purpose; namely, it permits the user to improve to 20D the accuracy of a tabulated constant known to him to lower precision, and it also permits the possible identification of a number obtained empirically or as the result of a calculation. Similarly, Table IV enables the user to obtain closed-form expressions for the sums of a large number of power series.

In the space of this review it is impossible adequately to describe the variety of mathematical constants in Table I. Suffice it to say that a partial enumeration of the contents includes: square roots, cube roots, and reciprocals of selected integers (and sums, differences, and rational multiples thereof); powers and combinations of powers of π, e, and γ (including submultiples); special values of such functions as trigonometric and hyperbolic functions (both direct and inverse), logarithms (both natural and common), Bessel functions (including zeros thereof), Riemann zeta function and related functions, gamma and psi functions, probability integral and Dawson's integral, sine and cosine integrals; as well as the real roots of selected algebraic and transcendental equations.

The authors calculated anew the values of about half the entries in Table I, using double-precision arithmetic on a Wang 720 programmable desk calculator. Furthermore, this reviewer has independently checked more than 70 percent of the contents of Table I, and discovered that only about one percent of the tabulated values that he examined require any correction. These corrections are separately listed in this issue.

The authors have presented herein a valuable collection of numerical material apparently not available in any other single source. It is to be hoped that they will issue a revised, enlarged edition in the near future.

J. W. W.

13 [7].—MELVIN KLERER & FRED GROSSMAN, *A New Table of Computer Processed, Indefinite Integrals*, Dover Publications, Inc., New York, 1971, xiii + 198 pp., 24 cm. Price $3.00 (paperbound).

The following is quoted from the introduction to this book:

"This volume is a product of a computer science research program begun by M. Klerer at Hudson Laboratories, Columbia University and continued at the School of Engineering and Science, New York University. During 1963, M. Klerer and J. May implemented a programming system that accepted mathematical expressions typed in normal (pre-computer) textbook notation. The typing was done on a modified computer input-output typewriter terminal. Individual characters could be typed in any order and mathematical symbols, such as integral operators, could be constructed in any size. The typing did not have to be neat or symmetric, and mistakes could be erased by backspacing and over-typing or by pressing an "erase" key which produced a special code tagging the particular location for subsequent computer processing. Two-dimensional positioning of the paper to permit the typing of subscripts, superscripts, or fraction expressions was done by keyboard control using the space, backspace, sub (half-line down), and sup (half-line up) keys. Besides eliminating a good deal of the effort usually required in translating mathematical expressions into FORTRAN code, this system, since it was entirely free format, allowed easy input by unskilled typists.

"Since this new programming system was part of a long-range effort directed toward the automation of applied mathematics, it was natural to consider the feasibility of making mathematical tables accessible to this computer system."

The introduction describes in detail the process of culling integrals from known tables and processing them to produce the final table of integrals. More than seven years have passed since the project began and, no doubt, current techniques are much improved. Nonetheless, the final output is readable and pleasing to the eye.

The tables themselves differ little from several already available tables. Integrals are divided into eight basic categories which are rational, algebraic, irrational, trigonometric, inverse trigonometric, exponential, logarithmic, hyperbolic and inverse hyperbolic.

The integrals were taken from eight commonly used and well-known tables. In the culling process, the authors made a study of the reliability of these tables and the results are reported in the introduction. On the basis of the discussion given there, one might expect that the present tables should not be faulty and that they are free of errors. Such is not the case and glaring inconsistency abounds throughout. In the illustration on p. 2, there appear the entries

$$\int \frac{DX}{X} = \mathrm{LN}\,|X| \quad \text{and} \quad \int \frac{DX}{1 - X} = -\mathrm{LN}(1 - X).$$