REVIEWS AND DESCRIPTIONS OF TABLES AND BOOKS

The numbers in brackets are assigned according to the indexing system printed in Volume 22, Number 101, January 1968, p. 212.

13 [2.05, 2.30, 2.55, 7].—YUDELL L. LUKE, *On generating Bessel Functions by Use of the Backward Recurrence Formula*, Report ARL 72–0030, Aerospace Research Laboratories, Air Force Systems Command, United Air Force, Wright-Patterson Air Force Base, Ohio, February 1972, iv + 40 pp., 27 cm.

Approximations to the Bessel functions $I_\nu(z)$ and $J_\nu(z)$, which result from J. C. P. Miller's well-known backward recurrence algorithm, are here expressed in terms of hypergeometric functions. It transpires that some of these approximations are identical with certain rational approximations developed elsewhere by the author [1]. The truncation error and the effect of rounding errors are similarly analyzed. Realistic a priori error bounds emerge along with a demonstration that rounding errors in Miller's algorithm are insignificant.

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1. Y. L. LUKE, *The Special Functions and Their Approximations*, Vols. 1 and 2, Academic Press, New York, 1969.

14 [2.10].—A. H. STROUD, *Approximate Calculation of Multiple Integrals*, Prentice-Hall, Inc., Englewood Cliffs, N. J., 1971, xiii + 431 pp., 23 cm. Price $16.50.

The approximate integration of functions of one variable is a subject which today is reasonably well understood, both in its theoretical and practical ramifications, and which is extensively documented in a number of books. The same, unfortunately, cannot be said for integration in higher dimensions. There are several reasons for this. On the theoretical side, one faces the problem of having to cope with an infinite variety of possible regions over which to integrate, in contrast to one dimension, where every connected region is an interval. In addition, there is no theory of orthogonal polynomials in several variables coming to our aid, which would be comparable in simplicity to the well-known one-dimensional theory. On the practical side, one runs up against what R. Bellman refers to as "the curse of dimensionality". The tensor product of a two-point quadrature rule in 100 dimensions calls for $2^{100} \doteq 10^{30}$ function evaluations, a task well beyond the capabilities of even the fastest computers of today. In spite of these formidable difficulties, a good deal of progress has been made, particularly in the last couple of decades. The book under review is the first major attempt of summarizing and codifying current knowledge in the field. The only major omission is S. L. Sobolev's theory of formulas "with a regular boundary layer", which, however, is discussed in a recent survey article by S. Haber [1], and is also expected to be the subject of a forthcoming book by Sobolev.