selected by Michael Danos and Johann Rafelski, Verlag Harri Deutsch, Thun, Frankfurt/Main, 1984, 468 pp., 24 cm. Price $20.00.

As noted in the Preface, the need for numerical tables, particularly those of the elementary mathematical functions, has been largely obviated by the advent of microelectronics in the interim of more than two decades since the original Handbook first appeared (see the review in [1]). Accordingly, in this abridged edition only one-third of the original numerical tables have been retained, and further reduction has been achieved through the omission of the first and final two chapters as well as, regrettably, the lists of references at the ends of successive chapters.

Otherwise, the body of the original text, including the numbering of the formulas, has been preserved to permit direct cross reference to the original. An improvement has resulted from the correction of most of the known typographical errors and the slight enlargement of the original second chapter, including the updating of tabulated physical constants.

For many users of the original, bulky volume this portable abridgment should be a convenient, adequate substitute.

J.W.W.

1. RMT 1, *Math. Comp.*, v. 19, 1965, pp. 147–149.

19a[33–04, 33A45, 65A05].—H. F. BAUER & W. EIDEL, *Tables of Roots with Respect to the Degree of a Cross Product of Associated Legendre Functions of First and Second Kind*, Forschungsbericht der Universität der Bundeswehr München, Institut für Raumfahrttechnik, LRT-WE-9-FB-9, 1986, 81 pp.

b[33–04, 33A45, 65A05].—HELMUT F. BAUER & W. EIDEL, *Tables of Roots with Respect to the Degree of a Cross Product of Associated Legendre Functions and Derivative of First and Second Kind*, Forschungsbericht der Universität der Bundeswehr München, Institut für Raumfahrttechnik, LRT-WE-9-FB-14, 1986, 183 pp.

c[33–04, 33A45, 65A05].—H. F. BAUER & W. EIDEL, *Tables of Roots with Respect to the Degree of a Cross Product at the First Derivative of Associated Legendre Functions of First and Second Kind*, Forschungsbericht der Universität der Bundeswehr München, Institut für Raumfahrttechnik, LRT-WE-9-FB-15, 1986, 83 pp.

Helmut F. Bauer has previously written about Legendre functions [1] and has published tables of zeros of the associated Legendre function of the first kind, $P_\lambda^m(\cos\alpha)$, and its derivative [2], [3]. The three tables reviewed here are an extension of that work. The tables supply five-decimal values of the first ten λ-zeros of the following cross products:

(FB-9) $$P_\lambda^m(\cos\alpha)Q_\lambda^m(\cos\beta) - P_\lambda^m(\cos\beta)Q_\lambda^m(\cos\alpha),$$

(FB-14) $$P_\lambda^{m'}(\cos\alpha)Q_\lambda^m(\cos\beta) - P_\lambda^m(\cos\beta)Q_\lambda^{m'}(\cos\alpha),$$

(FB-15) $$P_\lambda^{m'}(\cos\alpha)Q_\lambda^{m'}(\cos\beta) - P_\lambda^{m'}(\cos\beta)Q_\lambda^{m'}(\cos\alpha).$$

Here, P_λ^m and Q_λ^m are the associated Legendre functions in the usual notation and primes indicate derivative with respect to the argument $\cos\alpha$ or $\cos\beta$. In each table the ranges of the parameters are $\alpha = 20°(10°)170°$, $\beta = 10°(10°)\alpha - 10°$, $m = 0(1)9$.

Using software developed at the National Bureau of Standards [4], [5], [6] and run on a CDC 180/855 computer, values in the tables were checked by calculating the value of the appropriate cross product for the given λ, and also for $\lambda \pm .00001$. In every case tested, the absolute value of the cross product at λ was the smallest of the three, and there was a change of sign from $\lambda - .00001$ to $\lambda + .00001$, confirming that the given zero was correct. FB-9 was most fully tested. For $\alpha \leq 80°$, at least four values of λ were tested for each pair of α and β. For $\alpha \geq 90°$, at least two values of λ were tested for each α and β pair. In FB-14 and FB-15, at least one λ for each pair of α and β was tested. Overall, 626 of 40800 entries, approximately 1.5%, were tested and all were correct. The introductory pages of each table have a number of typographical errors and inconsistencies. For example, $P_\lambda^{m'}(\cos\alpha)$ also appears as $P_\lambda^{'m}(\cos\alpha)$ and reference [3] of this review (Bauer's reference [24]) is listed as being on pages 601–602 and 529–541 of this journal instead of on pages 601–602 and S29–S41. However, these misprints do not affect the accuracy of the tables.

JOHN M. SMITH

Computer Services Division (715)
National Bureau of Standards
Gaithersburg, Maryland 20899

1. H. F. BAUER, "Flüssigkeitsschwingungen in Kegelbehälterformen," *Acta Mech.*, v. 43, 1982, pp. 185–200.

2. H. F. BAUER, "On the numerical value of the roots of the associated Legendre function with respect to the order*," *Z. Angew. Math. Mech.*, v. 61, 1981, pp. 525–527.

3. HELMUT F. BAUER, "Tables of the roots of the associated Legendre function with respect to the degree," *Math. Comp.*, v. 46, 1986, pp. 601–602, S29–S41.

4. J. M. SMITH, F. W. J. OLVER & D. W. LOZIER, "Extended-range arithmetic and normalized Legendre polynomials," *ACM Trans. Math. Software*, v. 7, 1981, pp. 93–105.

5. D. W. LOZIER & J. M. SMITH, "Algorithm 567. Extended-range arithmetic and normalized Legendre polynomials," *ACM Trans. Math. Software*, v. 7, 1981, pp. 141–146.

6. F. W. J. OLVER & J. M. SMITH, "Associated Legendre functions on the cut," *J. Comput. Phys.*, v. 51, 1983, pp. 502–518.

* "Order" here should be "degree".

20[01A35, 11D09].—LEONARDO PISANO FIBONACCI, *The Book of Squares*, An Annotated Translation into Modern English by L. E. Sigler, Academic Press, Orlando, Fla., 1987, xx+124 pp., $23\frac{1}{2}$ cm. Price $19.95.

Leonardo Pisano, generally referred to as Fibonacci for the past century and a half, has been acclaimed the greatest European mathematician of the Middle Ages. His renown is largely due to his authorship of several mathematical classics, of which the most advanced is *Liber quadratorum* (*The Book of Squares*). Therein he ingeniously used geometrical algebra, as exemplified in Book II of Euclid's *Elements*, to explore the relation of integer squares to sums of sequences of odd integers.