J. D. Fulton and the second of the present authors [3] have established the existence of two new arithmetical functions of the Fibonacci numbers, by virtue of a fixed-point theorem; namely, "$\pi(m) = m$ if and only if $m = (24)5^{\lambda-1}$ for some integer $\lambda > 1$"; and an iteration theorem: "There exists a unique smallest positive integer ω such that $\pi^{\omega+1}(m) = \pi^{\omega}(m)$, where $\pi^{n+1}(m) = \pi^{n}\{\pi(m)\}$ for $n \geqq 1$." The authors call these functions $\omega(m)$ and $\lambda(m)$ such that $\pi^{\omega}(m) = (24)5^{\lambda-1}$, the *Fibonacci frequency* of m and the *Leonardo logarithm* of m, respectively.

The tables are arranged so that the five functional values for each of 300 consecutive arguments appear on each page. Equivalent Latin letters are used in the headings because of the resulting convenience in printing directly from the computer output tapes. The computation of the table was performed on an IBM 360/75 system in one hour.

These attractively printed tables supplement earlier tables, which have been restricted to tabular arguments that are primes. This restriction, however, is not serious with respect to the functions $\alpha(m)$ and $\pi(m)$, since their values for composite m equal the least common multiples of the values corresponding to the constituent prime powers.

Important references not listed by the authors include a paper by Wall [4] and a book by Jarden [5], which has a very extensive bibliography, arranged chronologically.

J. W. W.

1. MARVIN WUNDERLICH, *Tables of Fibonacci Entry Points*, The Fibonacci Association, San Jose State College, San Jose, Calif., January 1965. (For a joint review of this and the following reference, see *Math. Comp.*, v. 20, 1966, pp. 618–619, RMT **87** and **88**.)

2. DOUGLAS LIND, ROBERT A. MORRIS & LEONARD D. SHAPIRO, *Tables of Fibonacci Entry Points, Part Two*, The Fibonacci Association, San Jose State College, San Jose, Calif., September 1965.

3. JOHN D. FULTON & WILLIAM L. MORRIS, "On arithmetical functions related to the Fibonacci numbers," *Acta Arithmetica*. (To appear.)

4. D. D. WALL, "Fibonacci series modulo m," *Amer. Math. Monthly*, v. 67, 1960, pp. 525–532.

5. DOV JARDEN, *Recurring Sequences*, second edition, Riveon Lematematika, Jerusalem, 1966. (See *Math. Comp.*, v. 23, 1969, pp. 212–213, RMT **9**.)

32[9, 10, 11, 12].—R. F. CHURCHHOUSE & J. C. HERZ, Editors, *Computers in Mathematical Research*, North-Holland Publishing Co., Amsterdam, 1968, xi + 185 pp., 23 cm. Price $9.00.

This book consists of fifteen papers and an extensive bibliography about the application of computers to mathematical research.

The papers are as follows:

"Machines and pure mathematics," by D. H. Lehmer discusses some of the opportunities for involving, not replacing, the pure mathematician with the computer. The author also submits a case for the construction of special purpose hardware for application to mathematical research.

"Congruences for modular forms," by A. O. L. Atkin describes in general terms the author's attempts to extend and generalize congruence properties of modular forms with the aid of a computer.

"Covering sets and systems of congruences," by R. F. Churchhouse describes the application of a computer to the problem of determining the number of distinct solutions of a system of congruences, and, in particular, to determine covering sets of congruences.

"A tabulation of some information concerning finite fields," by J. H. Conway gives a brief account of some extensive tables of information concerning finite fields computed by the author and M. J. T. Guy.

"On a specific similarity of finite semigroups," by P. Deussen describes and characterizes a refinement of the notion of similarity suggested by the theory of finite automata.

"Calculs algébriques dans l'anneau des vecteurs de Witt," by J. J. Duby is concerned with the application of a computer to the algebraic manipulation of Witt vectors.

"An algorithm that investigates the planarity of a network," by A. J. W. Duijvestijn reports on the author's investigations of planarity of networks using a computer.

"On some number-theoretical problems treated with a computer," by C. E. Fröberg briefly discusses the application of computers to Wilson and Fermat remainders, inverses of twin primes and Möbius power series.

"L'usage heuristique des ordinateurs en mathématiques pures," by G. Glaeser discusses some experiences in using a computer in analytical mathematical research.

"Sur la cyclabilité des graphes," by J. C. Herz discusses the cyclability of graphs and describes an investigation of hypo-hamiltonian graphs using a computer.

"A problem in stable homotopy theory and the digital computer," by A. Liulevicius describes an algorithm and its machine implementation for the construction of families of vector spaces which start spectral sequences approximating the p-primary components of the homotopy groups of spheres.

"Obtention automatique des équations de Runge et Kutta," by J. Martinet and Y. Siret discusses the automatic derivation of Runge-Kutta formulae. A systematic method is given for writing Runge-Kutta formulae of arbitrary rank and order.

"A method for computing the simple character table of a finite group," by J. K. S. McKay describes a method for determining the character table of a finite group given in terms of a generator and relation presentation.

"Periodic forests of stunted trees: the identification of distinct forests," by J. C. P. Miller describes in detail the identification of distinct individual forests, and some results obtained using computer examination of the various forests and tesselations are given.

"Computations on certain binary branching processes," by S. M. Ulam gives a brief account of some computations performed on a combinatorial problem suggested by a certain schematized model of evolution.

The bibliography contains some 300 references. It is intended to cover all published papers involving the use of computers as an aid to mathematical research except for papers published after 1966, papers of restricted circulation, and papers on boolean function minimization, error-correcting codes, experimental testing of numerical methods, construction of function tables and studies in "automatic proving."

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