35[9].—EDGAR KARST, *The Second* 2500 *Reciprocals and their Partial Sums of all Twin Primes* $(p, p + 2)$ *between* (102911, 102913) *and* (239387, 239389), Department of Mathematics, University of Arizona, Tucson, Arizona, February 1972. Ms. of 253 computer sheets deposited in the UMT file.

This manuscript table is a direct continuation of one [1] by the author giving 20D reciprocals of the first 2500 twin primes, together with 20D cumulative sums of these reciprocals. As in the previous table a useful supplementary table of two computer sheets here lists the first member of each of the subject prime pairs.

The author states that comparison of his list of twin primes with the tables of Selmer & Nesheim [2] and of Tietze [3] has revealed no discrepancies.

The announced motivation for the present tables is the testing of the author's conjecture that the sum of the reciprocals of the twin primes (counting 1 as a prime) closely approximates π. However, the calculation of Fröberg [4] implies that this sum to 4D is 3.0352, which does not appear to substantiate this conjecture to any reasonable degree.

J. W. W.

1. EDGAR KARST, *The First* 2500 *Reciprocals and their Partial Sums of all Twin Primes* $(p, p + 2)$ *between* (3, 5) *and* (102761, 102763), Department of Mathematics, University of Arizona, Tucson, Arizona, January 1969. (See *Math. Comp.*, v. 23, 1969, p. 686, RMT 52.)

2. E. S. SELMER & G. NESHEIM, "Tafel der Zwillingsprimzahlen bis 200000," *Norske Vid. Selsk. Forh. Trondheim*, v. 15, 1942, pp. 95–98.

3. H. TIETZE, "Tafel der Primzahl-Zwillinge unter 300000," *Bayer. Akad. Wiss. Math.-Nat. Kl. S.-B.*, 1947, pp. 57–72.

4. CARL-ERIK FRÖBERG, "On the sum of inverses of primes and of twin primes," *Nordisk Mat. Tidskr. Informationsbehandling*, v. 1, 1961, pp. 15–20.

36[9].—ELVIN J. LEE & JOSEPH S. MADACHY, "The history and discovery of amicable numbers—Part 1," *J. Recreational Math.*, v. 5, April 1972.

This is the text of the published version of our previously reviewed [1]. The table of amicable numbers has been increased from the previous 977 pairs to 1095 pairs and includes all pairs known to the authors through the end of 1971. The table is not given here but will follow in "succeeding issues" of the *Journal of Recreational Mathematics.*

For more detail of the contents of this paper see our previous review [1]. The main change in the present edition, besides a second author (the editor of JRM) and a slightly changed title, is the inclusion of brief reports on the subsequent work of Henri Cohen, Walter Borho, A. Wolf, Richard David and Harry Nelson. These authors account for the extra 118 pairs in the table. No doubt there will be a supplement at the end of the table since new pairs are still coming in.

The paper lists a new "aliquot 4-cycle" due to R. David, and subsequently David found three others. Adding these to Cohen's eight cycles and Borho's one gives a present total of thirteen 4-cycles. Counting Tuckerman's new perfect number, which is also listed here, the number of cycles satisfying $s^{(k)}(n) = n$ is now 24 for $k = 1$, 1095 for $k = 2$, 13 for $k = 4$, and 1 each for $k = 5$ and 28. There still are none for

$k = 3$ (called "crowds" in England) but Borho's analytical work may assist in settling this.

It is stated here that no amicable pair is known that does not terminate an aliquot chain. A priori, the reviewer sees no compelling reason to doubt the existence of one since, analogously, the perfect number 28 does not terminate a chain.

D. S.

1. ELVIN J. LEE, *The Discovery of Amicable Numbers, Math. Comp.*, v. 24, 1970, pp. 493–494, RMT **40**.

37[9].—RUDOLF ONDREJKA, *Mersenne Primes and Perfect Numbers*, ms. of 91 computer sheets (undated) deposited in the UMT file.

Herein are listed in decimal, octal, and binary form, respectively, the exact values of the first 23 Mersenne primes and the corresponding perfect numbers. Also presented are such relevant statistics as the number of decimal digits in each number, the corresponding digital sum, the frequency distribution of these digits and the associated cumulative frequency distribution.

The author includes explicit expressions of the perfect numbers as sums of cubes of successive odd numbers, sums of successive powers of 2, and sums of arithmetic progressions.

Appropriate entries in these tables were compared by the author with corresponding results of Uhler [1]. Also, the eighteenth Mersenne prime was checked against the value of Riesel [2], and the last three Mersenne primes listed here were checked against the corresponding results of Gillies [3].

Furthermore, this reviewer has successfully compared the statistics herein with corresponding data found by Lal [4].

It seems appropriate to note here that an additional Mersenne prime has been recently announced by Tuckerman [5].

J. W. W.

1. H. S. UHLER, "Full values of the first seventeen perfect numbers," *Scripta Math.*, v. 20, 1954, p. 240, where references to Professor Uhler's previous related calculations are given.

2. H. RIESEL, "A new Mersenne prime," *MTAC*, v. 12, 1958, p. 60.

3. D. B. GILLIES, *Three New Mersenne Primes and a Conjecture*, Report No. 138, Digital Computer Laboratory, University of Illinois, Urbana, Illinois, 1964.

4. M. LAL, *Decimal Expansion of Mersenne Primes*, Department of Mathematics, Memorial University of Newfoundland, St. John's, Newfoundland, 1967. (See *Math. Comp.*, v. 22, 1968, p. 232, RMT **20.**)

5. B. TUCKERMAN, "The 24th Mersenne prime," *Proc. Nat. Acad. Sci. U.S.A.*, v. 68, 1971, pp. 2319–2320.

38[9].—G. AARON PAXSON, *Table of Aliquot Sequences*, Standard Oil Co. of California, 225 Bush Street, San Francisco, California 94120, computer output, 134 sheets filed in stiff covers and deposited in the UMT file in 1966.

Let $s(n)$ be the sum of the *aliquot parts* of n, i.e. divisors of n other than n itself. According as $s(n) = n$, $<n$ or $>n$, n is *perfect*, *deficient* or *abundant*. Define $s^0(n) = n$, $s^{k+1}(n) = s(s^k(n))$, $k \geqq 0$. The author tabulates $s^k(n)$ for $k = 0, 1, 2, \cdots$, and each