35 [7].—HENRY E. FETTIS & JAMES C. CASLIN, *Tables of Toroidal Harmonics*, III: *Functions of the First Kind—Orders* 0—10, Report ARL 70-0127, Aerospace Research Laboratories, Air Force Systems Command, United States Air Force, Wright-Patterson Air Force Base, Ohio, July 1970, iv + 391 pp., 28 cm. [Copies obtainable from National Technical Information Service, Springfield, Virginia 22151. Price $3.00.]

The first table in this report consists of 11S values (in floating-point form) of the Legendre function of the first kind, $P^m_{n-1/2}(s)$, for $m = 0(1)10$, $s = 1.1(0.1)10$, and degree n ranging from 35 to 160, as in two earlier companion reports [1], [2], which were devoted to the tabulation of the Legendre function of second kind, $Q^m_{n-1/2}(s)$.

This table is followed by a tabulation, also to 11S, of the same function for similar orders m and for arguments $s = \cosh \eta$, where $\eta = 0.1(0.1)3$. The upper limit for the degree, n, here varies from 34 to 450.

A concluding table gives values of the cross product $P^m_{n+1/2}(s)Q^m_{n-1/2}(s) - Q^m_{n+1/2}(s)P^m_{n-1/2}(s)$ to 16S for $m = 0(1)10$, $n = 0(1)450$. This table evolved from spot-checking the other tables by means of identities that were derived from the known Wronskian relation and that are presented in the introductory section describing the method [3] of calculation by means of IBM 1620 and IBM 7094 systems.

Also included is a discussion of the application of toroidal functions to the determination of the potential field induced by a charged circular torus.

J. W. W.

1. HENRY E. FETTIS & JAMES C. CASLIN, *Tables of Toroidal Harmonics*, I: *Orders* 0–5, *All Significant Degrees*, Report ARL 69-0025, Aerospace Research Laboratories, Office of Aerospace Research, United States Air Force, Wright-Patterson Air Force Base, Ohio, February 1969. (See *Math. Comp.*, v. 24, 1970, pp. 489–490, RMT **36**.)

2. HENRY E. FETTIS & JAMES C. CASLIN, *Tables of Toroidal Harmonics*, II: *Orders* 5–10, *All Significant Degrees*, Report ARL 69-0209, Aerospace Research Laboratories, Office of Aerospace Research, United States Air Force, Wright-Patterson Air Force Base, Ohio, December 1969. (See *Math. Comp.*, v. 24, 1970. pp. 989–990, RMT **70**.)

3. HENRY E. FETTIS, "A new method of computing toroidal harmonics," *Math. Comp.*, v. 24, 1970, pp. 667–670.

36 [8].—LUDO K. FREVEL, *Evaluation of the Generalized Binomial Density Function*, Department of Chemistry, The Johns Hopkins University, Baltimore, Maryland, 1972. Ms. of 13 pp. deposited in the UMT file.

The author defines herein a generalized binomial density function by the relation

$$\beta(x; n, \alpha) = \frac{\Gamma(1 + 2n)(\sin \alpha)^{2(n+x)}(\cos \alpha)^{2(n-x)}}{\Gamma(1 + n + x)\Gamma(1 + n - x)}$$

which reduces to the standard binomial function $b(k; m, p)$ when $x = m/2 - k$, $n = m/2$, and $\alpha = \arcsin p^{1/2}$.

A table of this function is included for $\alpha = \pi/4$, $x = 0(0.05)3$, and $n = -0.1$, 0, 0.1, 1, 2; it was computed to 10D on a Wang 360 calculator before truncation of the final tabular entries to 8D.

In addition, a probability density function $\phi_n(x)$ is defined in terms of $\beta(x; n, \alpha)$ by the relation

$$\phi_n(x) = \left[\int_{-n-1}^{n+1} \beta(\xi; n, \alpha)\, d\xi\right]^{-1}\left[\frac{1}{2} + \frac{1+n-|x|}{2\,|1+n-|x||}\right]\beta(x; n, \alpha),$$

and the normalizing factor $\int_{-n-1}^{n+1} \beta(\xi; n, \alpha)\, d\xi$ is tabulated to 5D for $n = 0, 0.1, 0.5, 1, 2, \infty$.

Two computer plots are also included: one of $\beta(x; n, \pi/4)$ for the tabular arguments; the other of $\beta(x; 0, \alpha)$ for $\alpha/\pi = 0.05(0.05)0.25$ and $-1 \leqq x \leqq 3$.

J. W. W.

37 [9].—M. Lal, C. Eldridge & P. Gillard, *Solutions of* $\sigma(n) = \sigma(n + k)$, Memorial University of Newfoundland, May 1972. Plastic bound set of 88 computer sheets (unnumbered) deposited in the UMT file.

The function $\sigma(n)$ is the sum of all positive divisors of n. Table 2 contains 50 separate tables. The kth of these gives all $n \leqq 10^5$ such that

(1) $\sigma(n) = \sigma(n + k)$.

Also listed here are $n + k$ and $\sigma(n)$.

Table 1 gives the number of solutions above for each k. Thus, $k = 1$ has 24 solutions, the first being $n = 14$ and the last being $n = 92685$.

An earlier table, apparently unpublished, was by John L. Hunsucker, Jack Nebb, and Robert E. Stearns, Jr. of the University of Georgia. This larger table listed all 113 solutions for $k = 1$ and $n \leqq 10^7$. Their last is $n = 9693818$. They had the same 24 solutions $< 10^5$. They also computed (1) for all $1 \leqq k \leqq 5000$ and $n + k \leqq 2\cdot 10^5$, and so should include everything here deposited. I have not seen this larger table.

In their larger range of n there are still only two solutions for $k = 15$: $n = 26$ and $n = 62$. Won't someone please prove that there are only two? Or are there others?

D. S.

38 [9].—Sol Weintraub, *Four Tables Concerning the Distribution of Primes*, 23 pages of computer output deposited in the UMT file, 1972.

Tables 2, 2A and 2B (6 pages each) are very similar to Weintraub's earlier [1]. See that review for the definitions of GAPS, PAIRS, ACTUAL, and THEORY. For the same variable $k = 2(2)600$, Table 2 lists these four quantities for the 11078937 primes in $0 < p < 2\cdot 10^8$; Table 2A for the (unstated number of) primes in $10^{16} < p < 10^{16} + 25\cdot 10^5$; and Table 2B for the 255085 primes in $10^{17} < p < 10^{17} + 10^7$. Nothing extraordinary occurs in these tables that requires special mention. The largest gap here is a case of $k = 432$ in Table 2A. ACTUAL and THEORY agree very well, as expected.

Table A (5 pages) covers the same range as Table 2 does. For $n = 1(1)200$ it first lists