alternate terms, only half the terms are needed. The terms of odd rank are computed, and from twice the sum of these the appropriate value of the probability integral is subtracted."

The computation was started at $x=1.9$ to enable a check to be made with some of Dawson's results; for $x=1.92$, the authors found that $I=12.70733$, instead of Dawson's value 12.703175 . For other Dawson errors see MTE 46. The values of the key arguments were computed $\geqslant 10 \mathrm{~S}$, and to 7 D for the intermediate ones, except at the extreme end of the table.

The integral $I$ appears in problems of mathematical physics, hydrodynamics, etc. H.B. has supplied the following references (the authors of the table under review make no acknowledgment that information concerning references $4-5$ below was supplied to them) :

1. K. Terazawa, R. So. London, Proc., v. 92A, 1916, p. 68; $g(x)=e^{-x^{2}} \int_{0}^{x} e^{t^{2}} d t$, as well as its first and second derivatives, are tabulated, $x=[0(.1) 1(1) 3,5,10 ; 3-5 \mathrm{D}], x^{2}=2,3,5,7$.
2. K. Terazawa, Tôhoku Univ., Sci. Reports, v. 6, 1917, p. 172-173; tables of $g(x)$ and first four derivatives $x=[0(.1) 1,4,5,10 ; 3-5 D], x^{2} / 2=.6(.2) 6$. These functions arise in consideration of the oscillation of a deep-sea surface caused by a local disturbance.
3. E. E. Watson, Phil. Mag., s. 7, v. 3, 1927, p. 850, graph of $F(R)=\int_{1}^{R} d x(\ln x)$ $=2 \int_{0}^{(\ln R)^{\frac{1}{2}}} e^{t^{2}} d t, 0<R<7$; in discussing the dispersion of an electron beam.
4. N. Kapzov \& S. Gwosdower, Z.f. Physik, v. 45, 1927, p. 133, the function $x \cdot e^{-x^{2}} \int_{0}^{x} e^{t^{2}} d t$ is tabulated for $x=[.1, .5, .8(.2) 1.2(.05) 2.2 ; 5 \mathrm{D}] ; \Delta, 1.5-2.2$. The use for such a table arises in discussion of oscillations in electron tubes.
5. S. Sakomoto, Sächs. Akad. d. Wissen., Berichte ü. d. Verh., math.-phys. Kl., v. 80, 1928, p. 217-223, who gives tables of $g(x)$ and $g(x) / x$ for $x=[0(.01) 10 ; 4 \mathrm{D}]$; they were needed in a problem of heat conduction under certain boundary conditions.
6. W. L. Miller \& A. R. Gordon, J. Phys. Chem., v. 35, 1931, p. 2878-2882, $g(x)$ for $x=0(.01) 4(.05) 7.5(.1) 10(.2) 12 ; 0-1.99 ; 6 \mathrm{D}, 2-4.95 ; 8 \mathrm{D}, 5-12 ; 9 \mathrm{D}$. The computation for $x=0-2$ was based on the uncorrected Dawson table.
In the Library of Brown University the authors have deposited a Ms. giving the values of $I$ as follows:

$$
x=[0(.01) .1(.1) 1.8 ; 10 \mathrm{D}],[1.9(.1) 4 ; 5-9 \mathrm{D}] .
$$

> R. C. A.

## MATHEMATICAL TABLES-ERRATA

References have been made to errata in no. 7 of $M T A C$, part II, Bibliography, under Airey 19, Airy 4, 5, Bessel, Bourget, BAASMTC 1, Carrington, Colwell \& Hardy, Dale, Davis \& Kirkham, Dinnik 8, 9, 10, 11, 14, Doodson, Gray \& Mathews, Hayashi, Jahnke \& Emde (also under Bisacre), Kalähne, Karas, Lehmer, Lommel 2, 3, Maclean, Meissel 1, 5, NYMTP 3, Nicholson 1, Rayleigh 8, A. Russell (under Maclean), Schleicher, Schulze, B. A. Smith 1, Steiner, Tölke, Watson, A. G. Webster, Willson \& Peirce. See also RMT 163 (Davis), 164 (Fisher \& Yates), 166 (Takagi), 167 (Bierens de Haan), 168 (Dawson); UMT 24 (Potin); MAC 11 (Adams); N 21 (Degen, Wrinch).
44. BAASMTC, Mathematical Tables, v. 1, London, 1931.
P. 5, $\cos 26.1$, for $.56756 \cdots$, read $.56755 \cdots$
P. 7, $\sin 47.6$, for $.46832 \cdots$, read $.45832 \ldots$

It will be noted that in both cases a 5 has been converted to a 6 .
L. J. C.
45. Brown \& Sharpe, Formulas in Gearing with Practical Suggestions. Seventeenth ed., second printing, Providence, R. I., 1943. Compare RMT 123, p. 143.
There are two omissions on p. 225,

$$
0.6944=25 / 36 \text { and } 0.7556=34 / 45
$$

> L. J. C.
46. H. G. Dawson, "On the numerical value of $\int_{0}^{h} e^{x^{2}} d x$," London Math. So., Proc., v. 29, 1898, p. 519-522. This is a table $h=[0(.01) 1.99 ; 6 \mathrm{D}]$ and $h=[2 ; 5 D]$. Dawson writes "The foregoing table is true to six figures." Compare RMT 168.

1. A more precise statement of this table's accuracy, based upon differencing tests (as well as spot checking at $h=1$ and $h=2$ ) is the following: For $h \leqslant .79$, the table is good to within 2 units in the 6th decimal; for $h>.79$, the table is good to within a unit in the 6 th significant figure except for a major error at $h=1.92$ where Dawson gives 12.703175 which should read 12.707331 (obtained by the author both from Dawson's formula and from the Maclaurin series). [This result has been already published by Terrill and Sweeny, see RMT 168.] In particular, for $h=1.85$ to 1.99 , the last digit is meaningless.

The following corrections apply to the text: On p. 519, in the second equation, the second term in parentheses on the right side reads $e^{-\left(9 \pi^{2} / a^{2}\right)} \cdot \cos (3 \pi x / a)$ and it should read $e^{-\left[9 \pi^{2} /\left(4 a^{2}\right)\right]} \cdot \cos (3 \pi x / a)$. The last equation on p. 519 is not obtained by putting $a=1$, but by setting $a=\frac{1}{2}$ and then subtracting the second equation from the first equation. On p. 522, the quantity $\Delta^{2} u_{h}$, which occurs in a checking equation, is to be understood as meaning the second central difference and not the advancing difference, so that according to present day notation, it should read $\delta^{2} u_{h}$.

## H. E. Salzer

## NYMTP

2. We recomputed the whole of Dawson's table using the same method as before. When the tables were compared we found 27 errors involving the last two or more places, and 47 last place errors, not including last place errors of one unit. It is apparent that any list of corrections would be rather cumbersome, and it seemed better to publish Dawson's table in a corrected edition, which appeared in Franklin Institute, J., v. 238, 1944, p. 220-222.
H. M. Terrill
3. R. A. Fisher and F. Yates, Statistical Tables . . . , 1938; compare MTE 9 and Corrigenda, p. 171.
P. 8, for $\frac{1}{8 P Q}=\frac{1}{2\left(1-R^{2}\right)}$, read $\frac{1}{2 P Q}=\frac{2}{1-R^{2}}$.
P. 27, $n=3, P=.01$, for 11.341, read 11.345.
P. 41, 6.9, for 15.340, read 15.240; 7.1, for 7.5056, read 7.5062; 8.7, for 2147, read 2354.
P. 42, $p=72 \%$, for 58.7, read 58.1.
P. $55, n=24, \lambda$ of $\xi_{1}^{\prime}$, for 1, read 2.
P. 88, middle $C$ of piano, for 522 , read 261.
P. 90, for 1 sack $=3$ bushels, read 1 sack $=4$ bushels.

Fisher and Yates, second ed., 1943, p. viii; compare RMT 164.
In the second edition are the following errors:
P. 35, unit errors in last decimal places, $n_{1}=2, n_{2}=12 ; n_{1}=5, n_{2}=13 ; n_{1}=8, n_{2}=23$; $n_{1}=1, n_{2}=26 ; n_{1}=6, n_{2}=28 ; n_{1}=5, n_{2}=29 ; n_{1}=4, n_{2}=60 ; n_{1}=6, n_{2}=\infty$.
P. 37, similarly 2-unit error for $n_{1}=8, n_{2}=5$; and unit errors as follows: $n_{1}=8, n_{2}=1$; $n_{1}=1, n_{2}=2 ; n_{1}=8, n_{2}=2 ; n_{1}=2, n_{2}=3 ; n_{1}=2, n_{2}=11 ; n_{1}=1, n_{2}=\infty$. These slips were discovered by comparison with the tables reviewed in RMT 102.
R. C. A.
48. R. L. Hippisley, (under the direction of George Greenhill) "Tables of elliptic functions" in E. P. Adams, Smithsonian Mathematical Formulae and Tables of Elliptic Functions, Washington, D. C., 1922. The following errors, corrected in the first reprint of this work in 1939, were discovered in 1938 (see UMT 28) during the checking of the table:

| for read |  |  |
| :---: | :---: | :---: |
| $20^{\circ}$ | $\mathrm{C}(21)=1.0275328991$ | 1.0275329001 |
| $30^{\circ}$ | $\mathrm{C}(36)=1.0488062525$ | 1.0488062625 |
| $55^{\circ}$ | $\mathrm{A}(28)=0.4625360691$ | 0.4625260691 |
| $65^{\circ}$ | $\mathrm{A}(19)=0.3126000376$ | 0.3126200376 |
| $75^{\circ}$ | $\mathrm{A}(2)=0.0312920711$ | 0.0312920691 |
| $81^{\circ}$ | $\mathrm{A}(14)=0.2008272392$ | 0.2008272389 |

Miami University
Oxford, Ohio
My attention has been called to an error in the Smithsonian . . . Tables of Elliptic Functions, 1939. On p. 273 in the next to the last column and the next to the last line

$$
\text { for } 0.8556225878, \text { read } 0.8656225878 .
$$

The correct value is given on the preceding page.
E. P. Adams

Princeton University
49. C. Jordan, Calculus of Finite Differences, Budapest, 1939.

On p. 435 are given the zeros of the Legendre polynomials $P_{n}(x)$ for $n=2(1) 5$. Apart from 3 unit errors in the 8 th decimal place, in $n=5, x_{0}$ (and $-x_{4}$ ) for -.90617994 , read $-.90617985 ; x_{1}\left(\right.$ and $\left.-x_{3}\right)$ for -.53846922 , read -.53846931 .

Also in the weight factors giver, on p. 518, apart from 2 unit errors in the 7 th decimal place, $A_{30}$ (and $A_{33}$ ), for .3478558, read . 3478548.

H. E. Salzer

NYMTP
50. M. Muskat, F. Morgan \& M. W. Meres, J. Applied Physics, v. 11, 1940, p. 212. See RMT 113.
In MTAC, p. 109 (Corrigenda, p. 204) reference was made to certain tables of A. Kalähne, 1906, reprinted in Jahnke \& Emde $1_{1}-1_{5}$, and criticized by Muskat, Morgan \& Meres. They claimed that the roots $x_{1}, x_{2}, x_{3}$ of the equation $J_{1}(x) N_{1}(k x)-J_{1}(k x) N_{1}(x)=0$ when $k=2$ would be more correct if $3.1917,6.3116,9.4446$ were substituted for those given by Kalähne; they claimed also that they calculated the solutions of the equation for other values of $k$, for the purpose of problems in which they were interested. Of their revised values the first two are certainly wrong, and although Kalähne's value for $x_{1}, k=2$, may be improved to read 3.1966 , and the value of $x_{2}$ may be incorrectly rounded off being very nearly 6.31235 , his values are the more reliable; it did not seem worthwhile to test $x_{3}$. The extra values given by Muskat, Morgan \& Meres, which we have not tested are for $k=3,6$ zeros to $4 \mathrm{D} ; k=5,7$ zeros, to 5 or $4 \mathrm{D} ; k=10,8$ zeros to 6 or 5 D . The remaining values agree precisely with those given by Jahnke \& Emde, both being acknowledged as from the same source, Kalähne.

The writer has six or more decimal values for many of the roots given by Kalähne.
J. C. P. Miller

## 51. NYMTP, Table of the Bessel Functions $J_{0}(z)$ and $J_{1}(z)$ for Complex Arguments. New York, 1943. Compare RMT 151.

C. R. Cosens of the Cambridge University Engineering Laboratory has pointed out that numerous labels of the $\theta$ curves in the contour charts on $\mathrm{p} . \mathrm{xv}$ and xvii are incorrect. On p. xv starting with the $90^{\circ}$ ray and proceeding to the right, the correct labels are as follows: $0^{\circ},-20^{\circ},-45^{\circ},-90^{\circ},-135^{\circ},-160^{\circ}, \mp 180^{\circ}, 160^{\circ}, 135^{\circ}, 90^{\circ}, 45^{\circ}, 20^{\circ}, 0^{\circ},-20^{\circ}$, $-45^{\circ},-90^{\circ}$ and $-135^{\circ}$.

The labels on the curves in the second quadrant, which are the "reflections" of the curves of the first quadrant in the imaginary axis $\left(90^{\circ}\right.$ ray) are the negatives of the labels on the corresponding curves in the first quadrant.

The labels on the curves in the third and fourth quadrants, which are the respective "reflections" of the curves of the second and first quadrants with regard to the real axis ( $0^{\circ}$ and $180^{\circ}$ rays) are the negatives of the corresponding curves in the first two quadrants.

On p. xvii starting with the imaginary axis and proceeding to the right, the correct labels are as follows: $90^{\circ}, 45^{\circ}, 20^{\circ}, 0^{\circ},-20^{\circ},-45^{\circ},-90^{\circ},-135^{\circ},-160^{\circ}, \mp 180^{\circ}, 160^{\circ}, 135^{\circ}$, $90^{\circ}, 45^{\circ}, 20^{\circ}, 0^{\circ},-20^{\circ}$, and $-45^{\circ}$. Starting with the imaginary axis and proceeding to the left, the correct labels are as follows: $90^{\circ}, 135^{\circ}, 160^{\circ}, \pm 180^{\circ},-160^{\circ},-135^{\circ},-90^{\circ},-45^{\circ}$, $-20^{\circ}, 0^{\circ}, 20^{\circ}, 45^{\circ}, 90^{\circ}, 135^{\circ}, 160^{\circ}, \pm 180^{\circ},-160^{\circ}$ and $-135^{\circ}$. The labels on the curves in the third and fourth quadrants, which are the respective "reflections" of the curves of the second and first quadrants in the real axis are the negatives of the labels on the corresponding curves in the first two quadrants.

The above italicized numbers refer to curves incorrectly labeled in the volume.

> A. N. Lowan
52. NYMTP, Tables of Probability Functions, v. 1, New York, 1941. Compare RMT 91, p. 48-51.
P. 131: The argument 6496 is missing and the argument .6497 is repeated twice.
P. 216: The first digit following the decimal point in the value of $\left(2 / \pi^{\mathfrak{y}}\right) e^{-\pi^{2}}$ corresponding to the argument 1.742 should read 0 instead of 5 .

A. N. Lowan

53. R. M. Page, 14000 Gear Ratios. . . . New York, The Industrial Press, 1942. See RMT 87, p. 21f.

This table has been completely checked (at my suggestion) by Mr. Sidney Jounston, a Manchester chartered accountant, who is a great enthusiast in all forms of table work. He has, in effect, recomputed the table, and, from his known thoroughness, it is not likely that any more errors remain to be found.

The errors in Table I are all casual, being either errors of transcription from the calculating machine, or typing errors. The errors in $51 / 46$ and $74 / 83$, which are the only ones (apart from the obvious typing slip in 66/15) that could affect Table 3, do so. Besides these

Table 1

| Page | Fraction | For | Read |
| :---: | :---: | :---: | :---: |
| 37 | 66/15 | 4.000 | $4 \cdot 400$ |
| 64 | 80/42 | .. 915 | 905 |
| 67 | 111/45 | 111/46 | 111/45 |
| 68 | 51/46 | ... 659652 | ... 695652 |
|  | 81/46 | $\ldots 562$ | ... 565 |
| 91 | 54/69 | ... 65965 | . . 69565 |
| 105 | 59/83 | $\ldots 57$ | .$^{49}$ |
|  | 74/83 | -891506... | -891566... |
|  | 81/83 | .. 16 | . . 46 |
| 113 | 113/91 | .. 212 | .. 242 |
| 119 | 21/97 | .. 84636 | .. 84536 |
| 137 | 5/115 | -143 ... | . 043 ... |

Table 2

| Page | Col. | For | Read | C-P |
| :---: | :---: | :---: | :---: | :---: |
| 145 | $\log$ | 5891228 | 5892228 | + 1000 |
| 146 | $\log$ | 6828919 | 6829819 | + 900 |
| 148 | log | 9330523 | 9330532 | + 9 |
| 149 | N | . 093340 | . 094340 |  |
| 150 | $\log$ | 0403286 | 0404287 | + 1001 |
| 151 | log | 1053423 | 1053432 | + 9 |
| 156 | log | 3364119 | 3364220 | + 101 |
| 157 | log | 3646981 | 3646991 | + 10 |
|  | log | 3795556 | 3794566 | - 990 |
|  | $\log$ | 3822168 | 3832168 | + 10000 |
| 158 | log | 4233436 | 4233446 | + 10 |
|  | log | 4237471 | 4237473 | + 2 |
| 160 | $\log$ | 4634515 | 4634416 | 99 |
| 163 | $\log$ | 5413722 | 5413622 | 100 |
| 164 | $\log$ | 5617868 | 5617968 | + 100 |
| 166 | $\log$ | 5878194 | 5878196 | + 2 |
| 169 | log | 6464408 | 6464410 | + 2 |
| 170 | log | 6608023 | 6608123 | + 100 |
| 174 | log | 7275252 | 7275255 | + 3 |
| 178 | $\log$ | 7688608 | 7688612 | + 4 |
| 179 | ratio | 37/57 | 35/57 |  |
| 180 | 10 g | 7978943 | 7978953 | + 10 |
| 181 | $\log$ | 8073085 | 8073095 | + 10 |
| 184 | $\log$ | 8364977 | 8364979 | + 2 |
|  | $\log$ | 8415375 | 8416375 | + 1000 |
| 186 | $\log$ | 8611838 | 8611849 | + 11 |
| 188 | $\log$ | 8771541 | 8771543 | + 2 |
| 190 | log | 8970710 | 8970720 | + 10 |
| 194 | $\log$ | 9322472 | 9322482 | + 10 |
|  | $\log$ | 9330528 | 9330532 | + 4 |
| 196 | N | -89 151 | -89157 |  |
|  | $\log$ | 9559333 | 9559324 | 9 |
| 202 | N | 1.00910 | 1.00909 |  |
| 203 | $\log$ | 0098706 | 0098708 | + 2 |
| 205 | log | 0243595 | 0243593 | 2 |
|  | N | 1.0620 | 1.0619 |  |
| 208 | $\log$ | 0477827 | 0477728 | 99 |
| 213 | N | 1.2181 | 1.2182 |  |
| 215 | $\log$ | 1083384 | 1083395 | + 11 |
|  | $\log$ | 1118956 | 1108957 | - 9999 |
| 217 | log | 1230617 | 1230627 | + 10 |
| 218 | $\log$ | 1299695 | 1299595 | 100 |
| 226 | N | 1.7013 | 1.7015 |  |
| 228 | $\log$ | 2498874 | 2498775 | 99 |
| 237 | log | 4053320 | 4053220 | 100 |
| 239 | N | $2 \cdot 6774$ | $2 \cdot 7674$ |  |
|  | $\log$ | 4559318 | 4559320 | + 2 |
| 247 | $\log$ | 6618978 | 6618987 | + 9 |
|  | $\log$ | 6823650 | 6833649 | + 9999 |
|  | log | 6825952 | 6835951 | + 9999 |
| 251 | $\log$ | 8728282 | 8728284 | $+2$ |
| 254 | $\log$ | 0721070 | 0731071 | + 10001 |
| 257 | N | 27/750 | 27.750 |  |
| 258 | $\log$ | 5873377 | 5873367 | 10 |

12 errors there are a number of unimportant errors of a unit in the last decimal. 30 of these are casual, but the following are systematic. On page 125 we find 35 values too small, including 100/103, so it is evident that too small a reciprocal of 103 was used. On page 137, for denominator 115, the values for numerators $9(23) 101$, which differ only in the first decimal, are in error. Similarly on page 140, for denominator 118, with the values for numerators 8 and $67(=8+59)$ and 12 and $71(=12+59)$. On page 141,8 values are too large and 12 too small; this is mysterious, and suggests that this page was done by a different process or by a different person.

The logarithms in Table 2 would naturally be formed by subtracting the logarithm of the denominator from that of the numerator. Between 20 and 25 per cent of the logs are in error by a unit, since the logarithms of both numerator and denominator were obviously rounded off to 7 decimals before subtraction. This would lead to a theoretical expectation of one error of +1 unit and one error of -1 unit in every 8 values, provided no systematic effects intrude. The denominators $2,4,5$ and 8 are very frequent, and lead to values of $N$ that could be looked up in an ordinary 7 -figure table. The fact that $\log 71 / 8=\log 8.875$ (for instance) is in error seems to indicate that this process has not been adopted. On the other hand, the 7 -figure logs of 2,4 and 5 are in error by less than $0 \cdot 1$ of the 7 th decinal, while that of $\log 8$ only just exceeds this limit; hence, taking into account the frequency of these numbers (and of their multiples by ten) whether as numerators or denominators, the theoretical expectation above becomes less than 25 per cent. Another effect tending to reduce this percentage is numerators or denominators of 1,10 or 100 , whose logs are exact. The effect of a 5 in the 8 th decimal of the log is seen in the logs of fractions containing 3 or 6 in the numerator or denominator; these bear a high proportion of systematic error. All these errors of a unit are unimportant, although most of them could easily have been avoided.

Far more serious are the 45 errors greater than a unit, although nine of them are of 2 units only, one of 3 units and two of 4 ; in 11 out of these 12 cases, Page's values are too low.

Table 3

| Page | Fraction |
| ---: | ---: |
| 279 | $15 / 76$ |
| 283 | $51 / 46$ |
| 296 | $78 / 37$ |
| 321 | $81 / 62$ |
| 332 | $74 / 83$ |
| 341 | $103 / 68$ |
| 348 | $93 / 89$ |


| For | Read |
| :---: | :---: |
| .196368 | .197368 |
| 1.108660 | 1.108696 |
| 2.101108 | 2.108108 |
| 1.306581 | 1.306452 |
| .891506 | .891566 |
| 1.514786 | 1.514706 |
| 1.044444 | 1.044944 |

Table 4

| Page | N |
| :---: | :---: |
| 379 | 1702 |
|  | 1755 |
| 380 | 1936 |
|  | 1984 |
| 391 | 4645 |
|  | 4851 |
| 398 | 7772 |
| 400 | 7790 |
|  | 9401 |


| For | Read |
| :---: | :---: |
| $27 \times 63$ | Delete |
| $15 \times 115$ | $15 \times 117$ |
| Insert | $22 \times 88$ |
| Insert | $32 \times 62$ |
| $49 \times 95$ | Delete |
| $41 \times 99$ | $49 \times 99$ |
| $76 \times 116$ | $67 \times 116$ |
| Insert | $82 \times 95$ |
| $79 \times 109$ | $79 \times 119$ |

This leaves 33 errors that could vitiate a 6 -figure calculation. In the list of errors, the last column shows the magnitude of each error. Those on pages 146 and 151 appear to be due to transpositions, but the remainder are subtraction errors, each of a unit in some particular column. Of the 14 errors lying between $10 \pm 1$, Page is too low in 12 cases; the larger errors are reasonably balanced. These errors are of a kind that anyone working by hand is liable to make, but a more experienced table-maker would have detected and eliminated them by summation or other checks. In this case, since the logs are symmetrical about $\log 1$, they could (after typing) have been added in convenient symmetrical groups of 10 to 20 , to produce totals whose last seven digits should always be 0 . Alternatively, many values could have been produced in at least two independent ways; thus $\log 25 / 36=\log 50 / 72$.

Table 3 consists of a rearrangement and rounding off of some of the values in Table 1. Apart from a very few unimportant rounding-off errors of a unit in the last decimal, there are seven errors, two of which are inherited from Table 1. The one on page 321 has been caused by combining the first three decimals of $81 / 62$ with the second three decimals of

82/62; that this has been allowed to pass indicates that this table was not compared, after typing, with Table 1, as it shoud have been.

In Table 4 there are three omissions, and two cases in which the same factors have been assigned to two numbers, namely $27 \times 63=1701$ (not 1702) and $49 \times 95=4655$ (not 4645).

Summarizing, we take the view that the standard of table-making shown in this volume is not high enough to meet modern requirements. In other words, the author has not been fair to his users. He, and his publishers, and the engineering public, should be grateful to Mr. Johnston for his complete duplication of the numerical work.
L. J. C.

## UNPUBLISHED MATHEMATICAL TABLES

References have been made to Unpublished Mathematical Tables in no. 7 of MTAC, part II, Bibliography under: Airey, BAASMTC 2, 3, 4, 5, 6, 7, 8 (Bickley, Mrs. Cashen, Comrie, Gwyther, Hartley, Johnston, Jones, J. C. P. Miller, Thompson), Comrie, Corrington \& Miehle, Darmstadt Technische Hochschule, H. T. Davis, J. Fischer, W. Fischer, Kohler, Morse \& Haurvitz, NYMTP 5, 6, 7, 8, 9, 10, 11, 12, 13, Tveritin. See also the first article of this issue, referring to a table by Miller \& Bickley).

24[A].-Table of $n!/ m!$. Ms. prepared by, and in possession of H. E. Salzer, NYMTP, 150 Nassau St., New York City.
The quantities $n!/ m$ ! were computed for $n=1(1) 42, m=\overline{n-2}(-2) 1$ if $n$ is odd, 2 if $n$ is even. Exact values or 20 significant figures are given. A similar larger table in L. Porin, Formules et Tables Numériques relatives aux Fonctions Circulaires, Hyperboliques, Elliptiques, Paris, Gauthier-Villars, 1925, p. 842-849, contains $n!/ m$ ! for $n=1,2, \cdots 50$ and $m=(n-1),(n-2)$ down to either 1 or $n-25$ (exact values). In Potin's notation, he tabulates $A_{m}^{n} \equiv m(m-1)(m-2) \cdots(m-n+1)$ for $m$ up to 50 and $n$ up to 25 .

The overlapping parts of the two tables were compared and the following errors are to be noted in Potin's values: In $A_{34}^{24}$, the sixth from the right group of three figures, for 403, read 463 . $A_{25}^{4}$, for 303100 , read 303600 . The following obvious errors occur in the text on p. 841: "pour $m$ et $n$ variant de 1 à 50 " is incorrectly stated, since the $n$ goes only as far as 25 . The formula $A_{m}^{n}=A_{m}^{n-1}(m+n-1)$ should read $A_{m}^{n}=A_{m}^{n-1}(m-n+1)$; and on the last line, $A_{m+1}^{n}$ should read $A_{m+i}^{n}$.

H. E. Salzer

25[A].-Table of the Coefficients of the Central Factorial Polynomials. Ms. prepared by, and in possession of H. E. Salzer, NYMTP.
This table lists the quantities $B_{2 m}^{2 n+2}$, the exact values of the coefficients of $x^{2 m}$ in the polynomials $x^{2}\left(x^{2}+1^{2}\right)\left(x^{2}+2^{2}\right) \cdots\left(x^{2}+n^{2}\right)$, of degree $2 n+2$, for $n=1(1) 20$, $2 m=\overline{2 n+2}(-2) 2$, i.e. up to polynomials of the 42 nd degree. The coefficients of $x^{2 m}$ in the central factorial polynomials $x^{[2 n+2]} \equiv x^{2}\left(x^{2}-1^{2}\right)\left(x^{2}-2^{2}\right) \cdots\left(x^{2}-n^{2}\right)$ are simply $(-1)^{m+n+1} B_{2 m}^{2 n+2}$ which are also denoted by $D^{2 m 0^{[2 n+2]}} /(2 m)$ ! where $D^{2 m} 0^{[2 n+2]}$ are usually known as the "central derivatives of zero." The values of $B_{2 m}^{2 n+2}$ were obtained from the recurrence formula $B_{2 m}^{2 n+2}=n^{2} B_{2 m}^{2 n}+B_{2 m-2}^{2 n}$, starting with $B_{2}^{2}=1, B_{m}^{2}=0$ for $m \neq 2$, and all values on the final manuscript were checked by the relation $\sum_{m=1}^{n+1}(-1)^{m+n+1} B_{2 m}^{2 n+2}=0$.

The quantities $B_{2 m}^{2 n+2}$ play an important role in the calculus of finite differences whenever central factorial polynomials are to be expressed in power series. They are used to calculate

