TABLE ERRATA

594.—W. Magnus, F. Oberhettinger & R. P. Soni, Formulas and Theorems for
the Special Functions of Mathematical Physics, third enlarged edition, Springer,

p. 1: Line 6 up: For \( t^n \), read \( \frac{t^n}{n!} \).

p. 13: Line 11 up: Read \( \psi(1 + z) = \) instead of \( = \).
Add \( , |z| < 1 \).

p. 13: Line 10 up: Read \( \psi(1 + z) = \) instead of \( = \).
Add \( , 0 < |z| < 1 \).

p. 13: Line 6 up: For \( \psi(z) \), read \( \psi(x) \).

p. 14: Line 1 up: For \( \psi''(z + l/m) \), read \( \psi''(z + l/m) \).

p. 15: Line 2 up: For \( \psi''(\frac{1}{2}) \), read \( \psi''(\frac{1}{2}) \).

p. 21: Line 6: For \( \Re z > -1 \), read \( \Re z > 1 \) [cf. EH I 32(7)].

p. 21: Line 7: For \( t^z \), read \( t^z \) [cf. EH I 32(8)].

p. 27: Line 7: Add \( , n = 1, 2, \ldots \) [cf. the first formula on this page].

p. 32: Line 3: Add \( n = 1, 2, \ldots \).
Line 10: For \( E^{m+1} \), read \( E^{(m+1)} \); for \( E^m \), read \( E^{(m)} \).

p. 33: Last line: For \( \Gamma(m + 2) \), read \( (m + 1)\Gamma(m + 2) \).
Add \( |\log z| < 2\pi \).

p. 34: Line 2 up: For \( \Re s < 1, 0 < \alpha < 1 \),
read \( \Re s < 0, 0 < \alpha < 1 \) [cf. EH I 28(6)].

p. 38: Line 11: For \( z_2 F_1 \), read \( \pm z_2 F_1 \).

p. 71: Last line: For \( \frac{\partial}{\partial z} \), read \( \frac{\partial}{\partial \nu} \).

P. 74 \{ 3.3.3 \} Replace \( z \) by \( x \) everywhere.

p. 75: Line 7: Add \( |\arg z| < \frac{1}{3}\pi \).

p. 75: Line 6 up: is incorrect.

p. 88: Line 3 up: Add \( \Re \mu > -\frac{1}{2} \), \( \Re \nu > -\frac{1}{2} \).

p. 89: Line 4: For \( J_{2\nu + 2m+1}(z) \), read \( J_{2\nu + 2m+1}(2z) \).

p. 124: Line 10 up: For \( \Gamma(\nu + 1) \), read \( a^{-\mu}\Gamma(\nu + 1) \).

p. 131: Line 8 up: Delete \((-1)^{n-1} \).
Line 6 up: Move \( B_{2n} \) to line 5 up.

p. 132: Line 6: Replace \( \infty \) by \( m_2 \).
Line 13 up: For \( \lfloor 2m \rfloor \), read \( \lfloor 2m \rfloor \).

p. 154: Line 3: For \( \left( \frac{z - 1}{z + 1} \right)^{\mu} \), read \( \left( \frac{z - 1}{z + 1} \right)^{\mu} \) [cf. EH I 141(17)].

p. 154: Line 7 up: For \( \Gamma(\frac{1}{2} - \mu) \), read \( \Gamma(\frac{1}{2} - \nu) \).
Line 4 up: For \( z + (z^2 - 1)^{1/2} \), read \( z - (z^2 - 1)^{1/2} \).

p. 167: Line 9 up: For \( \times F(\frac{1}{4} - \frac{1}{2} \nu - \frac{1}{2} \mu) \), read \( \times x F(\frac{1}{4} - \frac{1}{2} \nu - \frac{1}{2} \mu \) [cf. EH I 144(12)].

p. 174: Line 2 up: Replace \( z \) by \( x \).

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p. 176: Line 6: For $\sum_{n=0}^{\infty}$, read $\sum_{m=0}^{\infty}$ [cf. GR 1019].
For $(x)$, read $(z)$.

p. 177: cf. Hansen [1, p. 370] Formulas (56.2.8) and (56.2.9):
Line 7: Delete the comma.
Line 9: For $|t|<1$, read $|h|<1$.
Line 10: Add $\sum_{n=0}^{\infty} h^n Q_n(x)$, $-1 < x < 1$.
Line 11: For $\times(z-t)^{-1}$, read $(z-t)^{-1}$.

p. 178: Line above 4.5: For $Q_v$, read $Q_v$.

p. 179: Line 8: For $Q''_v(\cos \theta)$, read $Q''_v(\cos \theta)$ [cf. EH I 169(3) and Errata].

p. 180: Line 11 up: Replace the German $\Psi$'s by Latin $P$'s.

p. 182: Line 11 up: For $Q_v\theta)$, read $(-\cos \theta)$.

p. 195: Lines 17 and 18 up: According to EH I 162 Sec. 3.9.1:
Read: ... in $-\pi < \arg c < \pi$ even when the series does not converge, provided only that $\xi$ is not a real number....

p. 197: Line 2 up: The asymptotic behavior should read
$$e^{i\pi v(1/2 - 2z)^{-n-3/2}} \Gamma(n + \frac{3}{2} + \mu)/\Gamma(n + 2).$$

p. 200: Line 11 up: For $v \to 0$, read $\nu \to 0$.

p. 213: Line 8 up: For $\lambda^3$, read $\lambda^3 x$.
This corrects the corresponding entry in MTE 575 (Math. Comp., v. 36, 1981, p. 316).

p. 215: Line 12: Read $+Q^{(a, \beta)}_n$ instead of $-Q^{(a, \beta)}_n$ [cf. Szegö [2,(4.62.9)]].
Line 9 up: The integral representation is incorrect.
For $dz$ read $\frac{dz}{z-x}$.

p. 220: Line 4: Replace $\Gamma(n + 1)$ by $n!\Gamma(2\lambda)$.

p. 222: The last two equations of the recurrence relations for $C^\lambda_n$ are incorrect. Read instead:
$$C^{\lambda+1}_n(x) = xC^{\lambda+1}_{n-1}(x) + \frac{n+2\lambda}{2\lambda} C^{\lambda}_n(x).$$

p. 233: Line 8: Replace $\sqrt{1 - 2t \cos(\theta + \varphi) + t^2}$ by $\sqrt{1 - 2t \cos(\theta + \varphi) + t^2 + 1 - 2t \cos(\theta - \varphi) + t^2}$.
According to Hansen [1, p. 306], we have
\begin{align*}
\sum_{k=0}^{\infty} t^k P_k(\cos x) P_k(\cos y) &= \frac{4/\pi}{u+v} K\left(\frac{u-v}{u+v}\right) \\
&= \frac{2}{\pi u} K\left[\frac{2}{u}(t \sin x \sin y)^{1/2}\right] \\
&= \frac{2}{\pi v} K\left[\frac{2}{v}(-t \sin x \sin y)^{1/2}\right],
\end{align*}
where $u = [1 + t^2 - 2t \cos(x + y)]^{1/2}$, $v = [1 + t^2 - 2t \cos(x - y)]^{1/2}$. 

p. 234: Line 12 up: Read $m = 1$ instead of $m = 0$.

p. 235: Line 9 up: Read $i\sqrt{1 - x^2}$ instead of $\sqrt{x^2 - 1}$.
[Cf. the correction on p. 188 in MTE 477 (Math. Comp., v. 25, 1971, p. 201)].

p. 235: 5.4.3 Asymptotic expansions:
Note that the convention of EH I is used here, according to which $(x^2 - 1)^{1/2}$ is defined by

$$(x^2 - 1)^{1/2} := (x - 1)^{1/2}(x + 1)^{1/2}.$$ 

This means a deviation from the ordinary definition, i.e.,

$$w^a := \exp(\alpha \ln w).$$

The cut $ix \in (-\infty, \infty)$ of $(x^2 - 1)^a$ divides the complex $x$ plane in two disconnected parts. In the right-half plane, i.e. $\text{Re} \ x > 0$, we have (indeed)

$$(x^2 - 1)^a = (x - 1)^a(x + 1)^a.$$ 

However, in the left-half plane, $\text{Re} \ x < 0$, we have

$$
(x^2 - 1)^a = e^{-2i\pi a}(x - 1)^a(x + 1)^a, \quad \text{Im} \ x > 0, \\
= e^{+2i\pi a}(x - 1)^a(x + 1)^a, \quad \text{Im} \ x < 0.
$$

It may be noted, furthermore, that

$$
\frac{(x - 1)^a}{(x + 1)^a} = \frac{(x - 1)^a}{(x + 1)^a}
$$

for all $x \in \mathbb{C} \setminus (-\infty, 1]$.

By taking the appropriate limit of the right-hand side on part of the cut, $(-\infty, -1)$, it follows that the discontinuity across this part of the cut vanishes. This implies that the analytic continuation of the right-hand side on $(-\infty, -1)$ is equal to the left-hand side. The remaining cut is $[-1, 1]$.

p. 238: Line 7: For $0 \leq \theta < \pi, 0 \leq \phi < \pi$, read $0 \leq \phi < \theta < \pi$.

p. 239: Line 5: For $\cos n\delta$, read $\cos m\delta$ [Cf. EH I 168(2)].

p. 267: Line 6 up: For $(c - a)$, read $z(c - a)$.

p. 271: Line 4: For $W(w_1, w_6)$, read $W(w_1, w_7)$.

Line 5: For $W(w_1, w_7)$, read $W(w_1, w_6)$ [Cf. EH I, pp. 253 and 259].

p. 277: Line 6 up: For $2^{1-c}e^z$, read $2^{1-c}e^z$.

p. 284: Lines 2 and 3: Replace $\pi(v - z)$ by $(\pi v - z)$

In Line 2 the right-hand side should be preceded by a minus sign.

p. 288: Line 11 up: For $-2\gamma$, read $+2\gamma$. [Cf. EH I 261(13)].

Line 2 up: For $|z|^{Re\ e^z}$, read $|z|^{Re\ e^z}$ [Cf. EH I, pp. 257 and 261].


p. 304: Line 4: For $\sqrt[\nu]{} W_{\kappa+1/2, \nu-1/2}(z)$, read $-\sqrt[\nu]{} W_{\kappa+1/2, \nu-1/2}(z)$.

p. 493: In the definition of $n!$ replace the commas by the symbol $\cdot$. 

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The preceding list of errata is an abridgment of our Corrigenda Report 82 03. The inaccuracies and misprints of minor importance listed in this report have been omitted in this abridgement. Copies of the report will be available upon request.

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p. 35: (1) For $z < 2\pi$, read $0 <|z| < 2\pi$.

p. 136: (43) Second line: For $2\mu$, read $2^\mu$.

p. 143: Line 2: For (20), read (21).

p. 143: Line 3: For $\Gamma\left(\frac{1}{2} - \mu\right)$, read $\Gamma\left(\frac{1}{2} - \nu\right)$.

p. 144: (12) For $\times$ read $x$.

p. 231: (5) For $\times$, read $\cdot$.

p. 262: (6) For $\Re c - 2$, read $2 - \Re c$.

p. 266: (17) For $c^{-\pi c}$, read $e^{-\pi c}$.


p. 64: (6) Read $a^{-\nu}\left(\frac{1}{2}z\right)^{\alpha-\nu}$ instead of $(\frac{1}{2}az)^{\alpha-\nu}$.

p. 82: (24) Read $\Im(a^2z) < 0$ instead of $\Im(a^2z) > 0$.

p. 183: (47) Read $\cos m\varphi$ instead of $\cos n\varphi$.

p. 186: (30) Delete $1 + \cdot$.

p. 225: (5) Read $x + 1 - n$ instead of $x - n$.

(6) Add $0 \leq x \leq N$, $x$ integer.


p. 101: (15) For $1 + 2\Delta$, read $1 - 2\Delta$.

(29) The result 0 given for \( m \) even is incorrect. For example, take \( m = 2, n = 1 \).

(4) On the right-hand side \( y \) should be replaced by \( y/2 \) everywhere.

(5) Read \( y = 1, 2, 3, \ldots \) instead of \( y = 0, 1, 2, \ldots \).

(11) Read \( \sum_{0 < r < (y + n)/2} \) instead of \( \sum_{0 < r < (y + n)/2} \).

(8) The right-hand side should be divided by \( \sinh(\pi y) \); hence replace \( \cosh(\pi y) \) by \( \coth(\pi y) \).

(38) The result 0 given for \( m \) odd is incorrect. For example, take \( m = 1, n = 1 \).

For \( 0 < m < 2n \) read \( 0 < m < 2n \).

For \( \cos \) read \( \cos \).

For \( iB \) read \( -iB \).

For \( -ni \) read \( -mi \).

For \( 1 - ay \) read \( v - 1 - ay \).

For \( (-1)^{n+1} \) read \( (-1)^n \).

The right-hand side should read \( \frac{1}{2} \pi \coth(\pi y) \).

For \( 0 < \Re a < n \), read \( 0 < \Re \lambda < n \).

Read 2 instead of \( -2 \), both in the first line and in the second line on the right-hand side.

For \( \arg(1 - ab) \) read \( \arg(1 + ab) \).

For \( -\pi < \theta < \pi \), read \( 0 < \theta < \pi \).

is wrong, even after the correction suggested in the errata on page xvi. Its right-hand side should read

\[
(2a)^{-\nu} \Gamma(s) \exp \left( \frac{1}{4a} \right) \cos \left( \frac{1}{2} \pi s \right) D_s(a^{-1/2}), \quad \Re s > 0.
\]


For \( a^\nu \), read \( a^{\nu+1} \).

For \( \Gamma(\mu + n) \), read \( \Gamma(\mu + n + 1) \).

The right-hand side should be divided by \( n! \). In MTE 533 it is stated that for \( \Gamma(\alpha + n + 1) \) one should read \( \Gamma(\alpha + 1) \). Unfortunately, this is incorrect. The reason for this mistake is that the incorrect formula (3) on page 284 has been used for the derivation. (Cf. the corresponding entry in our list.)

The right-hand side should be multiplied by

\[
\Gamma(\alpha + n + 1)[n!\Gamma(\alpha + 1)]^{-1}.
\]
The preceding list of errata is an abridgment of our Corrigenda Report 82 04. The inaccuracies and misprints of minor importance listed in this report have been omitted in this abridgment. Copies of the report will be available upon request.

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p. 336: 8.10.3 The right-hand side should read, in part,
$$\frac{\pi e^{-\nu \mu} \csc[\pi(\nu - \mu)]}{2\Gamma(1 + \mu)}$$

p. 336: 8.10.6 In the denominator of the right-hand side,
for $\Gamma(\frac{1}{2} - \mu)$, read $\Gamma(\frac{1}{2} + \nu)$.

p. 440: 10.1.41 For $\left(\frac{1}{2}\pi/x\right)$, read $x^{-1}$.
10.1.42 For $\left(\frac{1}{2}\pi/x\right)$, read $x^{-1}$.
10.1.43 For $\left(\frac{1}{2}\pi/x\right)$, read $x^{-1}$.
10.1.44 For $\left(\frac{1}{2}\pi/x\right)$, read $-x^{-1}$.

p. 445: 10.2.35 Add $|re^{-i\theta}| < |\rho|$.

p. 508: 13.5.6 For $\Re b - 2$, read $2 - \Re b$.

p. 508: 13.5.9 For $\psi(a)$, read $\psi(a) + 2\gamma$.

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P. xxxii: Line 5 from bottom. Read $\int_{1}^{\infty}$ for $\int_{0}^{\infty}$.

P. 354: 3.531.1; and p. 533: 4.233.2. One is the negative of the other. Except for sign, there are slight differences in the numerical values.

P. 361: 3.551.5. Add $\beta > \gamma$.

P. 373: 3.631.15. The portion in braces can be expressed as
$$\frac{2^{-m}}{n - m} \binom{1}{1} F_1 \left( -m, -\frac{m - n}{2}; 1 - \frac{m - n}{2}; -1 \right)$$
$$-2^{-m} \frac{\Gamma(1 + m) \Gamma\left( \frac{n - m}{2} \right)}{\Gamma\left( \frac{m + n}{2} + 1 \right)} \cos\left( \frac{n - m}{2} \pi \right).$$
P. 374: 3.631.17. The portion in braces can be expressed as
\[
2^{-m-1} \frac{\Gamma(1 + m) \Gamma\left(\frac{n - m}{2}\right)}{\Gamma\left(\frac{m + n}{2} + 1\right)} \sin\left(\frac{n - m}{2}\right)\pi.
\]

P. 374: 3.631.18. The second parameter of the \(\text{_2F_1}\) should read \(-(a + m)/2\). The same error is in the source WA (Watson), but p. 313, not p. 342. It is also given incorrectly in MO (Magnus and Oberhettinger), p. 16. The result is also valid for \(a\) an integer. See also Errata #282, Math. Comp., v. 14, 1960, p. 221. If
\[
L_m = \int_0^\pi \cos^m x \cos ax dx,
\]
\[
L_{2r} = \frac{-2a \sin \pi a}{2^{2r}} \sum_{k=0}^{r-1} \frac{\binom{2r}{k}}{4(r - k)^2 - a^2} + \frac{2r \sin a\pi}{2^{2r}a},
\]
\[
L_{2r+1} = \frac{2a \sin a\pi}{2^{2r+1}} \sum_{k=0}^{r} \frac{\binom{2r + 1}{k}}{(2r + 1 - 2k)^2 - a^2}.
\]

P. 374: 3.631.20. Add \(\text{Re}(n) > -1\).

P. 374: 3.632.3. Add the condition \(n > 0\); Also for \(n \leq 0\) and \(p\) not an integer
\[
\int_0^\pi \cos^p x \sin(p + 2n)x dx = \frac{2^{n+1}}{n+p} \text{_2F_1}(1 - n, -p - n; 1 - p - n; \frac{1}{2}) - \frac{(p + 1 - 2n)\pi \cot(p - n)\pi}{(p + 1 - n)(1 - n)};
\]
for \(p\) an integer and \(n \neq 0\), use p. 373, 3.63.15; for \(p\) an integer, use p. 373, 3.63.16 if \(n = 0\).

P. 447: 3.824.3. The formula is correct, but an equivalent and more tractable form is
\[
\frac{-\pi}{2^{2m+1}a} \sum_{k=0}^{m} (-1)^k \left(\frac{2m}{m - k}\right) e^{-2ka}.
\]
Note: This formula as well as p. 448: 3.824.5,.6,.7 can be expressed in hypergeometric form since
\[
\sum_{k=0}^{m} \binom{p}{q - k} z^k = \frac{\Gamma(p + 1)}{\Gamma(q + 1) \Gamma(p - q + 1)} \text{_2F_1}(-q, 1; p - q + 1; -z).
\]

P. 448: 3.824.4. Lower limit of second sum should be 0.

P. 449: 3.827.1. The condition on \(v\) should read \(0 < \text{Re}\, v < 4\).

P. 455: 3.832.20. Add \(m = 0, 1, 2, \ldots\).

P. 455: 3.832.22. Read \(s > 0, n \gg 0, \text{Re}(a) > 0\); for \(n = 1\), see p. 406: 3.723.3.

P. 459: 3.838.3-.4. These are both special cases of 3.838.2. The latter holds for non-integer values of the exponents.
TABLE ERRATA

P. 477: 3.893.4. The integral is meaningless since the integrand has an infinite
number of poles on the path of integration, unless $a/b$ is an integer in
which case it becomes equivalent to 3.893.5 or 3.893.6 according as $a/b$
is odd or even, respectively.

P. 478: 3.895.2, .3, .5, .6, .8, .10. Remove the restriction $p \neq 0$ since all expres-
sions are valid in the limit as $p \to 0$.

P. 479: 3.895.12,. 14. Read $a \geq 0$, $n > 0$.

P. 479: 3.895.11, .13. Read $a \geq 0$. More tractable forms for equations (11)–(14)
are

\[
\begin{align*}
(11), (13): & \quad \text{Re} \left[ \frac{\pi(2n!)}{2^{2n+1} \sin \left( \frac{\alpha + i\beta}{2} \right) \pi \Gamma \left( n + 1 + \frac{\alpha + i\beta}{2} \right) \Gamma \left( n + 1 - \frac{\alpha + i\beta}{2} \right) } \right] \\
(12), (14): & \quad \text{Im} \left[ \frac{\pi(2n+1)!}{2^{2n+1} \cos \left( \frac{\alpha + i\beta}{2} \right) \pi \Gamma \left( n + \frac{1}{2} + \frac{\alpha + i\beta}{2} \right) \Gamma \left( n + \frac{1}{2} - \frac{\alpha + i\beta}{2} \right) } \right]
\end{align*}
\]

P. 481: 3.899.2: On the left-hand side read $\cos((4n + 1)x)$ for $\sin((4n + 1)x)$. On
the right-hand side read $-(k/p)^2$ in the exponent. The latter mistake is
also in the source BI.


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P. 589: 4.389.5. The right-hand side should read

\[
\frac{\pi}{2^{p+1}} \left[ C + \psi(p+1) - 2 \ln 2 \right] \quad (p > -1).
\]

The same correction should be applied to the source BI.

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The following errata were detected by use of the Soviet MIR-2 computer. The
author thanks Y. L. Luke for his aid in preparing this note for publication.

P. 298: 3.254.2. Replace $\Gamma(\lambda - \mu)$ by $\Gamma(\lambda - 2\nu)$.
P. 424: 3.768.3. Replace the right-hand side by $a^{-\nu-1/2}s_{\nu+1/2,1/2}(a)$

\[ [\text{Re } \nu > -1] \]

Note that this is a special case of an alternative representation for 3.768.5
given by H. van Haeringen and L. P. Kok in their list of errata. See Math.
P. 427: 3.771.12. In the first equation for \( s_{r,\nu}^{-1}(au) \) read \( s_{r,\nu}^{-1}(au) \). In the second equation for \( (\nu + \frac{1}{2}) \) read \( (\nu + \frac{1}{2})^{-1} \). [Re \( \nu > -\frac{1}{2} \)].

P. 681: 6.551.1. Replace \( (\nu - \frac{1}{2}) + J_{s}(y)S_{r/2}^{-1}(y) \) by \( (\nu - \frac{1}{2})J_{s}(y)S_{r/2}^{-1}(y) \). This pertains to the 4th edition only. 6551.1 is a special case of 6.561.13. See below.

P. 683: 6.561.6. In the right-hand side divide the second term by \( \pi \).

P. 684: 6.561.13. For the right-hand side read

\[
2\mu I_{\frac{\nu + \mu + 1}{2}} \left( \frac{\nu - \mu + 1}{2} \right) + a^{-\mu} \left\{ (\mu + \nu - 1)J_{s}(a)S_{\mu-1,\nu-1}(a) - J_{\nu-1}(a)S_{\mu,\nu}(a) \right\}.
\]

This is equivalent to

\[
a^{-\mu} \left\{ (\mu + \nu - 1)J_{s}(a)S_{\mu-1,\nu-1}(a) - J_{\nu-1}(a)S_{\mu,\nu}(a) \right\}.
\]

P. 702: 6.592.2. In the second term of the right-hand side replace \( 2^{1-r} \) by \( 2^{-1-r} \). See 6.592.7 below for a special case.

P. 702: 6.592.7. Replace \( \sqrt{\frac{\pi}{2}} \sec \frac{\nu \pi}{2} \) by \( \frac{\nu \pi}{2} \).

P. 849: 7.512.6. The right-hand side should read \( B(\lambda, \beta - \lambda)(1 - z/b)^{-a} \).

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On page 777, in formula 22.4.6 the value of \( P_n(0) \) should read

\[
\frac{(-1)^{m}m!}{2^m} \left( \begin{array}{c} m \\ m \\ \end{array} \right), \quad \text{for} \ n = 2m.
\]

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