Corrections to the "Mathematical Formulae" handbook

Current version: 2.4 (March 2016)

Version 1.1 → 1.1r

p15) **10. Integration:** the special case should read

$$\frac{\mathrm{d}}{\mathrm{d}x}\int_a^x f(y)\,\mathrm{d}y = f(x).$$

Version 1.1r → 1.2

p13) **10. Integration:** the first integral given is valid for $n \neq -1$ (not $n \neq 1$), and the RHS of the integral $\int \frac{x}{(x^2 \pm a^2)^n}\mathrm{d}x$ should read

$$\ldots = \frac{-1}{2(n-1)}\frac{1}{(x^2 \pm a^2)^{n-1}} + c.$$

Version 1.2 → 1.3

p2) **1. Series:** the second term for $\tan x$ should be $x^3/3$.

p17) **11. Differential Equations:** the solution of Laplace's equation in polar coordinates should read

$$\ldots\left[Ar^l + Br^{-(l+1)}\right]\ldots$$

and the differential equations for spherical harmonics should read

$$\left[\ldots + \frac{1}{\sin^2\theta}\frac{\partial^2}{\partial\varphi^2}\right]\ldots$$

Version 1.3 → 1.4

p1) **Physical Constants:** the units for g should be m s^{-2}.

p5) **3. Matrix Algebra:** the inverse of a matrix should read 'cofactor of transpose of A_{ij}' not 'cofactor of A_{ij}'.

p15) **10. Integration:** for the final reduction formulae, I_1 should be $1/2\alpha$.

p17) **11. Differential Equations:** for associated Legendre polynomials, $P_l^0(1) = 1$.

Version 1.4 → 1.5

p18) **11. Functions of several variables:** 'Stationary points' revised to read:

A function $\phi = f(x,y)$ has a stationary point when $\frac{\partial\phi}{\partial x} = \frac{\partial\phi}{\partial y} = 0$. Unless $\frac{\partial^2\phi}{\partial x^2} = \frac{\partial^2\phi}{\partial y^2} = \frac{\partial^2\phi}{\partial x\,\partial y} = 0$, the following conditions determine whether it is a minimum, a maximum or a saddle point.

$$\left.\begin{array}{ll}\text{Minimum:} & \frac{\partial^2\phi}{\partial x^2} > 0, \text{ or } \frac{\partial^2\phi}{\partial y^2} > 0, \\ \text{Maximum:} & \frac{\partial^2\phi}{\partial x^2} < 0, \text{ or } \frac{\partial^2\phi}{\partial y^2} < 0,\end{array}\right\} \text{ and } \frac{\partial^2\phi}{\partial x^2}\frac{\partial^2\phi}{\partial y^2} > \left(\frac{\partial^2\phi}{\partial x\,\partial y}\right)^2$$

$$\text{Saddle point: } \frac{\partial^2\phi}{\partial x^2}\frac{\partial^2\phi}{\partial y^2} < \left(\frac{\partial^2\phi}{\partial x\,\partial y}\right)^2$$

If $\frac{\partial^2\phi}{\partial x^2} = \frac{\partial^2\phi}{\partial y^2} = \frac{\partial^2\phi}{\partial x\,\partial y} = 0$ the character of the turning point is determined by the next higher derivative.

Version 1.5 → 2.0

p1) **Physical Constants**, updated to the CODATA 2006 least-squares adjustment values.

p7) **3. Matrix Algebra**: an additional 2 pages of tensor algebra (specific to the Part II course on Relativity) were added. But see below.

p25) **15. Laplace Transforms** (now p23), added a missing ')' to the Laplace transform of $\sin(\omega t)$.

Version 2.0 $\rightarrow$ 2.1

p7) **3. Matrix Algebra**: the additional 2 pages of tensor algebra (specific to the previous Part II course on Relativity) were removed.

p21/22) **14. Fourier Series and Transforms**: added correct normalisation factors ($2\pi/\tau$ for the Fourier transform of the sampling function, and $1/2\pi$ to the right hand side of the 'Conversely' version of the Convolution theorem).

Version 2.1 $\rightarrow$ 2.2

p1) **Introduction**: corrected spelling of 'Formulae' in the first sentence.

p6) **3. Matrix Algebra**: 'Bra-ket' entry for Hermiticity completed to read

$$\langle\psi|O|\phi\rangle = \langle\phi|O^\dagger|\psi\rangle^*,$$

and the Lowest eigenvalue entry completed to read

$$\lambda_0 \le \frac{\langle\psi|O|\psi\rangle}{\langle\psi|\psi\rangle}.$$

Version 2.2 $\rightarrow$ 2.3

p1) **Physical Constants**, updated to the CODATA 2010 least-squares adjustment values.

Version 2.3 $\rightarrow$ 2.4

p1) **Physical Constants**, updated to the CODATA 2014 least-squares adjustment values.

Dave Green, March 2016