

A Sample Document Using glossaries.sty

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Abstract

This is a sample document illustrating the use of the **glossaries** package. The functions here have been taken from “Tables of Integrals, Series, and Products” by I.S. Gradshteyn and I.M Ryzhik. The glossary is a list of special functions, so the equation number has been used rather than the page number. This can be done using the **counter=equation** package option.

Index of Special Functions and Notations

| Notation | Function Name | Number of Formula |
|---------------------------|--|-------------------|
| $B(x, y)$ | Beta function | 3.1–3.3 |
| $B_x(p, q)$ | Incomplete beta function | 3.4 |
| C | Euler's constant | 9.1 |
| $D_p(z)$ | Parabolic cylinder functions | 7.1 |
| $\operatorname{erf}(x)$ | Error function | 2.1 |
| erfc | Complementary error function | 2.2 |
| $F(\phi, k)$ | Elliptical integral of the first kind | 8.1 |
| G | Catalan's constant | 9.2 |
| $\Gamma(z)$ | Gamma function | 1.1, 1.2, 1.5 |
| $\gamma(\alpha, x)$ | Lower incomplete gamma function | 1.3 |
| $\Gamma(\alpha, x)$ | Upper incomplete gamma function | 1.4 |
| $H_n(x)$ | Hermite polynomials | 4.3 |
| $k_\nu(x)$ | Bateman's function | 6.2 |
| $\Phi(\alpha, \gamma; z)$ | confluent hypergeometric function | 6.1 |
| $\psi(x)$ | Psi function | 1.6 |
| $T_n(x)$ | Chebyshev's polynomials of the first kind | 4.1 |
| $U_n(x)$ | Chebyshev's polynomials of the second kind | 4.2 |

| Notation | Function Name | Number of Formula |
|------------|------------------|-------------------|
| $Z_\nu(z)$ | Bessel functions | 5.1 |

Chapter 1

Gamma Functions

$$\Gamma(z) = \int_0^\infty e^{-t} t^{z-1} dt \quad (1.1)$$

`\ensuremath` is only required here if using hyperlinks.

$$\Gamma(x+1) = x\Gamma(x) \quad (1.2)$$

$$\gamma(\alpha, x) = \int_0^x e^{-t} t^{\alpha-1} dt \quad (1.3)$$

$$\Gamma(\alpha, x) = \int_x^\infty e^{-t} t^{\alpha-1} dt \quad (1.4)$$

$$\Gamma(z) = \Gamma(\alpha, x) + \gamma(\alpha, x) \quad (1.5)$$

$$\psi(x) = \frac{d}{dx} \ln \Gamma(x) \quad (1.6)$$

Chapter 2

Error Functions

$$\text{erf}(x) = \frac{2}{\sqrt{\pi}} \int_0^x e^{-t^2} dt \quad (2.1)$$

$$\text{erfc} = 1 - \text{erf}(x) \quad (2.2)$$

Chapter 3

Beta Function

$$B(x, y) = 2 \int_0^1 t^{x-1} (1-t^2)^{y-1} dt \quad (3.1)$$

Alternatively:

$$B(x, y) = 2 \int_0^{\frac{\pi}{2}} \sin^{2x-1} \phi \cos^{2y-1} \phi d\phi \quad (3.2)$$

$$B(x, y) = \frac{\Gamma(x)\Gamma(y)}{\Gamma(x+y)} = B(y, x) \quad (3.3)$$

$$B_x(p, q) = \int_0^x t^{p-1} (1-t)^{q-1} dt \quad (3.4)$$

Chapter 4

Polynomials

4.1 Chebyshev's polynomials

$$T_n(x) = \cos(n \arccos x) \quad (4.1)$$

$$U_n(x) = \frac{\sin[(n+1) \arccos x]}{\sin[\arccos x]} \quad (4.2)$$

4.2 Hermite polynomials

$$H_n(x) = (-1)^n e^{x^2} \frac{d^n}{dx^n} (e^{-x^2}) \quad (4.3)$$

4.3 Laguerre polynomials

$$L_n^\alpha(x) = \frac{1}{n!} e^x x^{-\alpha} \frac{d^n}{dx^n} (e^{-x} x^{n+\alpha}) \quad (4.4)$$

Chapter 5

Bessel Functions

Bessel functions Z_ν are solutions of

$$\frac{d^2 Z_\nu}{dz^2} + \frac{1}{z} \frac{dZ_\nu}{dz} + \left(1 - \frac{\nu^2}{z^2} Z_\nu = 0\right) \quad (5.1)$$

Chapter 6

Confluent hypergeometric function

$$\Phi(\alpha, \gamma; z) = 1 + \frac{\alpha}{\gamma} \frac{z}{1!} + \frac{\alpha(\alpha+1)}{\gamma(\gamma+1)} \frac{z^2}{2!} + \frac{\alpha(\alpha+1)(\alpha+2)}{\gamma(\gamma+1)(\gamma+2)} \frac{z^3}{3!} + \cdots \quad (6.1)$$

$$k_\nu(x) = \frac{2}{\pi} \int_0^{\pi/2} \cos(x \tan \theta - \nu \theta) d\theta \quad (6.2)$$

Chapter 7

Parabolic cylinder functions

$$D_p(z) = 2^{\frac{p}{2}} e^{-\frac{z^2}{4}} \left\{ \frac{\sqrt{\pi}}{\Gamma\left(\frac{1-p}{2}\right)} \Phi\left(-\frac{p}{2}, \frac{1}{2}; \frac{z^2}{2}\right) - \frac{\sqrt{2\pi}z}{\Gamma\left(-\frac{p}{2}\right)} \Phi\left(\frac{1-p}{2}, \frac{3}{2}; \frac{z^2}{2}\right) \right\} \quad (7.1)$$

Chapter 8

Elliptical Integral of the First Kind

$$F(\phi, k) = \int_0^\phi \frac{d\alpha}{\sqrt{1 - k^2 \sin^2 \alpha}} \quad (8.1)$$

Chapter 9

Constants

$$\textcolor{red}{C} = 0.577\,215\,664\,901\dots \tag{9.1}$$

$$\textcolor{red}{G} = 0.915\,965\,594\dots \tag{9.2}$$