

Some mathematical formulas *

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Definite integrals:

$$\int_0^{\pi/2} \sin^\mu x \cos^\nu x \, dx = \frac{\Gamma(\frac{\mu+1}{2}) \Gamma(\frac{\nu+1}{2})}{2\Gamma(\frac{\mu+\nu}{2} + 1)}, \quad \int_0^1 t^{p-1}(1-t)^{q-1} \, dt = \frac{\Gamma(p)\Gamma(q)}{\Gamma(p+q)},$$
$$\int_{-\infty}^{\infty} e^{-ax^2+bx} \, dx = \sqrt{\frac{\pi}{a}} e^{\frac{b^2}{4a}},$$
$$\int_0^{\infty} x^{\mu-1} e^{-ax} \, dx = \frac{\Gamma(\mu)}{a^\mu}, \quad \int_0^{\infty} x^{\mu-1} e^{-ax^2} \, dx = \frac{\Gamma(\mu/2)}{2a^{\mu/2}}.$$

Special functions:

$$\Gamma(z+1) = z\Gamma(z), \quad \Gamma(n) = (n-1)!, \quad \Gamma(1/2) = \sqrt{\pi}.$$

$$H_{n+1} = 2\xi H_n - 2nH_{n-1}.$$

$$\rho^2 Z'' + \rho Z' + (\lambda^2 \rho^2 - \nu^2)Z = 0 \implies Z = c_1 J_\nu(\lambda\rho) + c_2 N_\nu(\lambda\rho).$$

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