

# Some mathematical formulas \*

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Sums:

$$\sum_{k=0}^n q^k = \frac{1 - q^{n+1}}{1 - q}.$$

Definite integrals:

$$\int_0^{\infty} x^{s-1} e^{-ax} dx = \frac{\Gamma(s)}{a^s}, \quad \int_0^{\infty} \frac{x^{s-1}}{e^x - 1} dx = \Gamma(s)\zeta(s),$$
$$\int_{x_1^2 + \dots + x_n^2 < 1} dx_1 \dots dx_n = \frac{\pi^{n/2}}{\Gamma(n/2 + 1)}.$$

Special functions:

$$\Gamma(z + 1) = z\Gamma(z), \quad \Gamma(n) = (n - 1)!, \quad \Gamma(1/2) = \sqrt{\pi},$$
$$\zeta(2) = \pi^2/6, \quad \zeta(4) = \pi^4/90.$$

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