

Formula sheet

Series

$$e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!}$$

$$\sin(x) = \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+1}}{(2n+1)!}$$

$$\cos(x) = \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n}}{(2n)!}$$

$$\frac{1}{1-x} = \sum_{n=0}^{\infty} x^n$$

$$\ln(1-x) = -\sum_{n=0}^{\infty} \frac{x^n}{n}$$

$$(1+x)^\alpha = \sum_{n=0}^{\infty} \frac{\alpha(\alpha-1)(\alpha-2)\dots(\alpha-n+1)}{n!} x^n$$

$$\frac{\pi^2}{6} = \sum_{n=1}^{\infty} \frac{1}{n^2}$$

$$G = \sum_{n=0}^{\infty} \frac{(-1)^n}{(2n+1)^2}$$

Euler's Formula

$$e^{ix} = \cos x + i \sin x$$

Weierstrass Substitution

$$\text{For } t = \tan\left(\frac{x}{2}\right), \sin x = \frac{2t}{1+t^2}, \cos x = \frac{1-t^2}{1+t^2} \text{ and } dx = \frac{2dt}{1+t^2}.$$

Integral formulas

$$\int_a^b f(x) dx = \int_a^b f(a+b-x) dx$$

$$\frac{d}{dt} \left(\int_a^b f(x,t) dx \right) = \int_a^b \frac{\partial}{\partial t} (f(x,t)) dx.$$