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

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

Integral formulas

$$\int_a^b f(x)\mathrm{d}x = \int_a^b f(a+b-x)\mathrm{d}x$$
$$\frac{\mathrm{d}}{\mathrm{d}t}\left(\int_a^b f(x,t)\mathrm{d}x\right) = \int_a^b \frac{\partial}{\partial t}(f(x,t))\mathrm{d}x.$$

Constants

$\pi = 3.14159265...$

$\mathrm{e} = 2.71828...$