

1 Image Tests



Inline image:



Figure 1: Test image centered in a figure environment.

2 Some beautiful mathematical equations

Ramanujan's formula:

$$\frac{1}{\pi} = \frac{2\sqrt{2}}{9801} \sum_{k=0}^{\infty} \frac{(4k)!(1103 + 26390k)}{(k!)^4 396^{4k}}$$

Euler's formula: $e^{i\pi} + 1 = 0$

Area of triangle with sides a,b,c is:

$$A = \frac{1}{2} \sqrt{s(s-a)(s-b)(s-c)}, \quad s = \frac{a+b+c}{2}$$

The most important formula in calculus:

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

Einstein's field equations:

$$R_{\mu\nu} - \frac{1}{2}g_{\mu\nu}R + \Lambda g_{\mu\nu} = \frac{8\pi G}{c^4}T_{\mu\nu}$$

Gamma function:

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

Pythagora's theorem:

$$a^2 + b^2 = c^2 + d^2$$

Logarithms:

$$\log ab = \log a + \log b$$

Navier-Stokes equation:

$$\rho \left(\frac{\partial \mathbf{v}}{\partial t} + \mathbf{v} \cdot \nabla \mathbf{v} \right) + \nabla p - \nabla \cdot \mathbf{T} = \mathbf{f}$$

Law of gravity:

$$F = G \frac{m_1 m_2}{r^2}$$

Fourier transform:

$$F(\omega) = \int_{-\infty}^{\infty} f(t) e^{-2\pi i t \omega} dt$$

Maxwell's equations:

$$\nabla \times \mathbf{E} = \frac{\rho}{\epsilon_0} \tag{1}$$

$$\nabla \cdot \mathbf{H} = 0 \tag{2}$$

$$\nabla \times \mathbf{E} = -\frac{1}{c} \frac{\partial \mathbf{H}}{\partial t} \tag{3}$$

$$\nabla \times \mathbf{H} = \frac{1}{c} \frac{\partial \mathbf{E}}{\partial t} \tag{4}$$

Schroedinger equation:

$$i\hbar \frac{\partial \psi}{\partial t} = H\Psi$$

Chaos theory:

$$x_{t+1} = kx_t(1 - x_t)$$

Information theory:

$$H = - \sum p(x) \log p(x)$$

Black-Scholes equation:

$$\frac{1}{2} \sigma^2 S^2 \frac{\partial^2 V}{\partial S^2} + rS \frac{\partial V}{\partial S} + \frac{\partial V}{\partial t} - rV = 0$$

Second law of thermodynamics:

$$dS \geq 0$$

Mass-energy equivalence:

$$E = mc^2$$

Basel problem:

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

Euler-Mascheroni constant:

$$\gamma = \lim_{n \rightarrow \infty} \left(\sum_{n=1}^{\infty} \frac{1}{n} - \log n \right) \approx 0.5772156649 \dots$$

Binomial expansion:

$$(a+b)^n = \sum_{k=0}^n \binom{n}{k} a^k b^{n-k}$$

Gauss:

$$\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}$$

The Callan-Symanzik equation:

$$\left[M \frac{\partial}{\partial M} + \beta(g) \frac{\partial}{\partial g} + n\gamma \right] G^n(x_1, x_2, \dots, x_n; M, g) = 0$$

Minimal surface equation:

$$\mathcal{A}(u) = \int_{\Omega} (1 + |\nabla u|^2)^{1/2} dx_1 dx_2 \dots dx_n$$

Multiline equations:

$$\begin{aligned} \cos 2\theta &= \cos^2 \theta - \sin^2 \theta \\ &= 2\cos^2 \theta - 1 \\ &= 1 - 2\sin^2 \theta \end{aligned}$$

And finally:

$$1 = 0.999999999999999999 \dots$$

Just for fun: $6 + 9 + 6 \cdot 9 = 69$

Quadratic equation:

$$ax^2 + bx + c = 0 \implies x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Two more ways to calculate pi:

$$\pi = \sum_{k=0}^{\infty} \left[\frac{1}{16^k} \left(\frac{4}{8k+1} - \frac{2}{8k+4} - \frac{1}{8k+5} - \frac{1}{8k+6} \right) \right]$$

$$\frac{2}{\pi} = \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{2 + \sqrt{2}}}{2} \cdot \frac{\sqrt{2 + \sqrt{2 + \sqrt{2}}}}{2} \dots$$

Cauchy's integral formula:

$$f(a) = \frac{1}{2\pi i} \int_C \frac{f(z)}{z - a} dz$$