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:

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

Einstain'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:

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

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:

$$\begin{aligned} \nabla \times \mathbf{E} &= \frac{\rho}{\epsilon_0} \\ \nabla \cdot \mathbf{H} &= 0 \\ \nabla \times \mathbf{E} &= -\frac{1}{c}\frac{\partial \mathbf{H}}{\partial t} \\ \nabla \times \mathbf{H} &= \frac{1}{c}\frac{\partial \mathbf{E}}{\partial t} \end{aligned} \tag{1}$$

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 or 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-Masceroni constant:

$$\gamma = \lim_{n\to\infty} (\sum_{n=1}^{\infty} \frac{1}{n} - \log n) \approx 0.5772156649\ldots$$

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:

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

Minimal surface equation:

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

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:

$$1 = 0.999999999999999999\ldots$$

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

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

Four more ways to calculate pi:

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

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

$$\pi = 3 + \cfrac{1}{7 + \cfrac{1}{15 + \cfrac{1}{1 + \cfrac{1}{292 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \ddots}}}}}}}$$

Chudnovsky Formula:

$$\frac{1}{\pi} = \frac{\sqrt{10005}}{4270934400} \sum_{k=0}^{\infty} \frac{(6k)!(13591409 + 545140134k)}{(3k)!\, k!^3 (-640320)^{3k}}$$

Cauchy's integral formula:

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

Stirling's factorial approximation:

$$n! = \sqrt{2\pi n} \left(\frac{n}{e}\right)^n \left(1 + O\left(\frac{1}{n}\right)\right)$$