MathJax Stress Test

This document combines baseline and hard-mode math coverage for fidelity validation.

Inline Math

The Gaussian integral is $\int_{-\infty}^{\infty} e^{-x^2}dx = \sqrt{\pi}$.
The value of $\zeta(2) = \sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6}$.

Baseline check: $f(x) = \int_{-\infty}^{\infty} \hat{f}(\xi) e^{2\pi i \xi x} d\xi$.
Symbol density: $\forall \epsilon > 0, \exists \delta > 0 \text{ s.t. } 0 < |x - c| < \delta \implies |f(x) - L| < \epsilon$.
Large operators: $\prod_{k=1}^{n} \left(1 + \frac{1}{k}\right) = n + 1$.

Display Math

Standard Identities

$$e^{i\pi} + 1 = 0$$

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

Maxwell's Equations

$$\begin{aligned}
\nabla \cdot \mathbf{E} &= \frac{\rho}{\varepsilon_0} \\
\nabla \cdot \mathbf{B} &= 0 \\
\nabla \times \mathbf{E} &= -\frac{\partial \mathbf{B}}{\partial t} \\
\nabla \times \mathbf{B} &= \mu_0\left(\mathbf{J} + \varepsilon_0\frac{\partial \mathbf{E}}{\partial t}\right)
\end{aligned}$$

Matrices and Arrays

The Jacobian matrix:

$$\mathbf{J} = \frac{d\mathbf{f}}{d\mathbf{x}} = \begin{bmatrix} \frac{\partial f_1}{\partial x_1} & \cdots & \frac{\partial f_1}{\partial x_n} \\ \vdots & \ddots & \vdots \\ \frac{\partial f_m}{\partial x_1} & \cdots & \frac{\partial f_m}{\partial x_n} \end{bmatrix}$$

Rectangular matrix stress case:

$$A = \begin{pmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{pmatrix}$$

Nested and Continued Fractions

$$x = a_0 + \cfrac{1}{a_1 + \cfrac{1}{a_2 + \cfrac{1}{a_3 + \cfrac{1}{a_4}}}}$$

Kitchen Sink Equation

$$\sqrt[n]{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}} \geq \lim_{h \to 0} \frac{\int_x^{x+h} \sin(t^2) dt}{h} \cdot \left(\biguplus_{j \in J} \mathcal{A}_j \right)$$

Escaped Dollars

I have $100 and $50, which is not math.
But $x = 5$ is math.