MathML Samples

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Elementary Math #1

$$\begin{array}{r} 1\,2\,3 \\ \times\,3\,2\,1 \\ \hline 1\,2\,3 \\ 2\,4\,6 \\ 3\,6\,9 \\ \hline \end{array}$$

Elementary Math #2

$$\begin{array}{r} 4\,3\,\overset{5}{\not 6}\,.\,3 \\ \overset{3}{\not 2}\,\big)\overline{1\,3\,0\,6} \\ \underline{1\,2} \\ 1\,0 \\ \underline{9} \\ 1\,6 \\ \underline{1\,5} \\ 1\,.\,0 \\ \underline{9} \\ 1 \end{array}$$

Simultaneous Equations

$$\begin{array}{rrl} 8.44x + 55 & y = & 0 \\ 3.1\ \ x - & 0.7y = & -1.1 \end{array}$$

Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Standard Deviation

$$\sigma = \sqrt{\frac{1}{N} \sum_{i=1}^{N} (x_i - \mu)^2}$$

Divergence

$$\nabla \cdot \vec{v} = \frac{\partial v_x}{\partial x} + \frac{\partial v_y}{\partial y} + \frac{\partial v_z}{\partial z}$$

Complex Number

$$c = \overbrace{\underbrace{a}_{\text{real}} + \underbrace{b\mathbb{i}}_{\text{imaginary}}}^{\text{complex number}}$$

De Morgan's Laws

$$\overline{\bigcup_{i \in I} A_i} \equiv \bigcap_{i \in \mathrm{I}} \overline{A_i}$$

Binomial Coefficient

$$C(n,k) = C_k^n = {}_nC_k = \binom{n}{k} = \frac{n!}{k!(n-k)!}$$

Bernoulli Trials

$$P(k) = \binom{n}{k} p^k (1-p)^{n-k}$$

Normal Distribution

$$f(x,\mu,\sigma) = \frac{e^{-\frac{(x-\mu)^2}{2\sigma^2}}}{\sigma\sqrt{2\pi}}$$

Lorenz Equations

$$\begin{aligned} \dot{x} &= \sigma(y-x) \\ \dot{y} &= \rho x - y - xz \\ \dot{z} &= -\beta z + xy \end{aligned}$$

Cross Product

$$\boldsymbol{V}_1 \times \boldsymbol{V}_2 = \begin{vmatrix} \boldsymbol{i} & \boldsymbol{j} & \boldsymbol{k} \\ \frac{\partial X}{\partial u} & \frac{\partial Y}{\partial u} & 0 \\ \frac{\partial X}{\partial v} & \frac{\partial Y}{\partial v} & 0 \end{vmatrix}$$

Axiom of Power Set

$$\forall A \, \exists P \, \forall B [B \in P \Longleftrightarrow \forall C (C \in B \Rightarrow C \in A)]$$

Cauchy's Integral Formula

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

Einstein's Field Equations

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

Legendre's Differential Equation

$$\frac{d}{dx}\left[(1-x^2)\frac{d}{dx}P_n(x)\right] + n(n+1)P_n(x) = 0$$

Sophomore's Dream

$$\int_0^1 x^x dx = \sum_{n=1}^{\infty} (-1)^{n+1} n^{-n} = -\sum_{n=1}^{\infty} (-n)^{-n}$$

Maxwell's Equations

$$\begin{cases} \nabla \times \overleftarrow{\boldsymbol{B}} - \frac{1}{c}\frac{\partial \overleftarrow{\boldsymbol{E}}}{\partial t} = \frac{4\pi}{c}\overleftarrow{\boldsymbol{j}} \\ \nabla \cdot \overleftarrow{\boldsymbol{E}} = 4\pi\rho \\ \nabla \times \overleftarrow{\boldsymbol{E}} + \frac{1}{c}\frac{\partial \overleftarrow{\boldsymbol{B}}}{\partial t} = \overleftarrow{\boldsymbol{0}} \\ \nabla \cdot \overleftarrow{\boldsymbol{B}} = 0 \end{cases}$$

Schwinger-Dyson Equation

$$\left\langle \psi \middle| \mathcal{T}\left\{ \frac{\delta}{\delta\phi} F[\phi] \right\} \middle| \psi \right\rangle = -i \left\langle \psi \middle| \mathcal{T}\left\{ F[\phi] \frac{\delta}{\delta\phi} S[\phi] \right\} \middle| \psi \right\rangle$$

Ramanujan Identity

$$\frac{1}{(\sqrt{\phi\sqrt{5}} - \phi) e^{\frac{25}{\pi}}} = 1 + \frac{e^{-2\pi}}{1 + \frac{e^{-4\pi}}{1 + \frac{e^{-6\pi}}{1 + \frac{e^{-8\pi}}{1 + \cdots}}}}$$

Rogers-Ramanujan Identity

$$\sum_{n=0}^{\infty} \frac{q^{n^2}}{(q)_\infty} = \frac{1}{\prod_{n=1}^{\infty} (1 - q^{5n-4})(1 - q^{5n-1})}, \quad \text{for } |q| < 1$$
$$= 1 + q + q^2 + q^3 + 2q^4 + 2q^5 + 3q^6 + \cdots$$

Moore Determinant

$$M = \begin{bmatrix} \alpha_1 & \alpha_1^q & \ldots & \alpha_1^{q^{n-1}} \\ \alpha_2 & \alpha_2^q & \ldots & \alpha_2^{q^{n-1}} \\ \vdots & \vdots & \ddots & \vdots \\ \alpha_m & \alpha_m^q & \ldots & \alpha_m^{q^{n-1}} \end{bmatrix}$$

Differentiable Manifold

$$\gamma_1 \equiv \gamma_2 \Leftrightarrow \begin{cases} \gamma_1(0) = \gamma_2(0) = p, \text{and} \\ \frac{d}{dt} \phi \circ \gamma_1(t) \Big|_{t=0} = \frac{d}{dt} \phi \circ \gamma_2(t) \Big|_{t=0} \end{cases}$$

Sphere Volume

Spherical coordinates derivation of the volume of a sphere $\left(\frac{4}{3}\pi R^3\right)$. The formula S for a sphere of radius R in spherical coordinates is: $S = \{0 \le \phi \le 2\pi, 0 \le \theta \le \pi, 0 \le \rho \le R\}$

$$\begin{aligned}
\text{Volume} &= \iiint\limits_S \rho^2 \sin\theta \, ⅆ\rho \, ⅆ\theta \, ⅆ\phi \\
&= \int_0^{2\pi} ⅆ\phi \int_0^{\pi} \sin\theta \, ⅆ\theta \int_0^R \rho^2 \, ⅆ\rho \\
&= \phi \Big|_0^{2\pi} (-\cos\theta) \Big|_0^{\pi} \frac{1}{3}\rho^3 \Big|_0^R \\
&= 2\pi \times 2 \times \frac{1}{3} R^3 \\
&= \frac{4}{3}\pi R^3
\end{aligned}$$

Cichoń's Diagram

$$\begin{array}{ccccccccc}
 & & \text{cov}(\mathcal{L}) & \longrightarrow & \text{non}(\mathcal{K}) & \longrightarrow & \text{cof}(\mathcal{K}) & \longrightarrow & \text{cof}(\mathcal{L}) & \longrightarrow & 2^{\aleph_0} \\
 & & \Big\uparrow & & \uparrow & & \uparrow & & \Big\uparrow & & \\
 & & & & \mathfrak{b} & \longrightarrow & \mathfrak{d} & & & & \\
 & & \Big| & & \uparrow & & \uparrow & & \Big| & & \\
\aleph_1 & \longrightarrow & \text{add}(\mathcal{L}) & \longrightarrow & \text{add}(\mathcal{K}) & \longrightarrow & \text{cov}(\mathcal{K}) & \longrightarrow & \text{non}(\mathcal{L}) & &
\end{array}$$

Multiscripts & Greek Alphabet

$${}^{\zeta}_{\varepsilon}\mathfrak{B}^{\eta}_{\theta}\,{}^{\beta}_{\alpha}\mathfrak{A}^{\gamma}_{\delta} \prod_{{}^{\chi}_{\phi}\mathfrak{F}^{\psi}_{\omega}}^{{}^{\kappa}_{\iota}\mathfrak{C}^{\lambda}_{\mu}} {}^{\xi}_{\nu}\mathfrak{D}^{o}_{\pi}\,{}^{\sigma}_{\rho}\mathfrak{E}^{\tau}_{\upsilon}$$

Stacked Exponents

$$g(z) = e^{-\sum_{i=0}^{\infty} z^{\frac{2}{\alpha - i}}}$$

Nested Roots

$$\frac{\sqrt{1 + \sqrt[3]{2 + \sqrt[5]{3 + \sqrt[7]{4 + \sqrt[11]{5 + \sqrt[13]{6 + \sqrt[17]{7 + \sqrt[19]{A}}}}}}}}}{ⅇ^{\pi}} = x'''$$

Nested Matrices

$$\begin{pmatrix}
\begin{pmatrix} a_1 & a_2 & a_3 & a_4 \\ a_5 & a_6 & a_7 & a_8 \end{pmatrix} & \begin{pmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \end{pmatrix} \\
\begin{matrix} 0 & \begin{pmatrix} c_1 & c_2 \\ c_3 & c_4 \end{pmatrix} \end{matrix} &
\end{pmatrix}$$

Font Sizes

scriptlevel: -3, -2, -1, 0, 1, 2, 3