- **std dev:**

$$\sigma_x = \sqrt{\langle (x - \langle x \rangle)^2 \rangle} = \sqrt{\frac{1}{N-1} \cdot \left(\sum_{i=1}^{N} {x_i}^2 - \frac{1}{N} \cdot \left(\sum_{i=1}^{N} x_i \right)^2 \right)}$$

- **std dev 2:**

$$\sigma_x = \sqrt{\langle (x - \langle x \rangle)^2 \rangle} = \sqrt{\frac{1}{N-1} \cdot \left(\sum_{i=1}^{N} x_i^2 - \frac{1}{N} \cdot \left(\sum_{i=1}^{N} x_i \right)^2 \right)}$$

- **rotation matrix:**

$$\mathbf{M}(\alpha) = \begin{pmatrix} \cos(\alpha) + n_x^2 \cdot (1 - \cos(\alpha)) & n_x \cdot n_y \cdot (1 - \cos(\alpha)) - n_z \cdot \sin(\alpha) & n_x \cdot n_z \cdot (1 - \cos(\alpha)) + n_y \cdot \sin(\alpha) \\ n_x \cdot n_y \cdot (1 - \cos(\alpha)) + n_z \cdot \sin(\alpha) & \cos(\alpha) + n_y^2 \cdot (1 - \cos(\alpha)) & n_y \cdot n_z \cdot (1 - \cos(\alpha)) - n_x \cdot \sin(\alpha) \\ n_z \cdot n_x \cdot (1 - \cos(\alpha)) - n_y \cdot \sin(\alpha) & n_z \cdot n_y \cdot (1 - \cos(\alpha)) + n_x \cdot \sin(\alpha) & \cos(\alpha) + n_z^2 \cdot (1 - \cos(\alpha)) \end{pmatrix}$$

- **like in label at bottom (no MM):**

$$\left(\left[\sqrt{2\pi \cdot \int_{-\infty}^{\infty} f(x)\, \mathrm{d}x} \right] \right)$$

- **like in label at bottom (MM):**

$$\left(\left[\sqrt{2\pi \cdot \int_{-\infty}^{\infty} f(x)\, \mathrm{d}x} \right] \right)$$

- **decoration:**

$$\vec{x}\vec{X}\vec{\psi} - -\dot{x}\dot{X}\dot{\psi} - -\ddot{x}\ddot{X}\ddot{\psi} - -\overline{x}\overline{X\psi} - -\underline{xX}\underline{\psi} - -\hat{x}\hat{X}\hat{\psi} - -\tilde{x}\tilde{X}\tilde{\psi} - -\underline{\underline{\underline{xX}}}\underline{\underline{\psi}} - -\overline{\overline{x}}\overline{\overline{\overline{X\psi}}} - -\bar{x}\bar{X}\bar{\psi} - -\overrightarrow{x}\overrightarrow{X}\overrightarrow{\psi}$$

- **mathtest:**

  This is normal text: $thisismath : \langle r^2(\tau) \rangle = \left\langle (\vec{r}(t) - \vec{r}(t+\tau))^2 \right\rangle \quad g(\tau) = \frac{1}{N} \cdot \left(1 + \frac{2}{3} \frac{\langle r^2(\tau) \rangle}{w_{xy}^2} \right)^{-1} \lfloor\rfloor \lceil\rceil \langle\rangle \left\{ \vec{a} \,|\, \|\vec{a}\|_2 \geq 2 \right\} \vec{r}\vec{R}$

$\frac{\sqrt{\sqrt{\sqrt{\sum_{i=0}^{\infty}\hat{\hat{i}}^2}+y^\alpha}+1}}{\dot{v}\equiv\ddot{r}}\arg\min_{\vec{k}}\sum_{\sqrt{i}=0}^{N}\int_{x_0}^{x_1}\left(\left(\left(x\right)\right)\right)\underbrace{\left[\left\{\frac{\partial f}{\partial x}\right\}\cdot\frac{1}{2}\right]}$ underbraced text $\hbar\cdots\frac{\sqrt{\sum_{i=0}^{2}\hat{\hat{i}}^2+y^\alpha}}{\dot{v}\equiv\ddot{r}},\hat{t}\hat{T}\overbrace{\left|\sqrt{x\cdot Y}\right|}\propto\mathbb{N}\circ\mathbb{Z}$
$\left\langle\overrightarrow{x(\tau)}\cdot\vec{R}(t+\bar{\tau})\right\rangle\alpha\beta\gamma\delta\epsilon\Gamma\Delta\Theta\Omega\left\lfloor\left\lceil\sqrt[3]{\hbar\omega}\right\rceil\right\rfloor$

- **chi2 test:**

$$\vec{p}^* = \arg\max_{\vec{p}}\chi^2 = \arg\max_{\vec{p}}\sum_{i=1}^{N}\left|\frac{\hat{f}_i - f(x_i;\vec{p})}{\sigma_i}\right|^2$$

- **upper/lower parantheses test:**

$$\text{bblabla}\frac{1}{2}\cdot\left(\frac{1}{\mathrm{e}^x+\mathrm{e}^{-x}}\right)\cdot\left(\frac{1}{\frac{1+2}{5+x}}\right)\cdot\left(\frac{1}{\exp\left[-\frac{y^2}{\sqrt{x}}\right]\cdot\exp\left[-\frac{1}{\frac{1}{2}}\right]}\right)$$

- **ACF test:**

$$g_{rg}^{ab}(\tau) = \frac{1}{N}\cdot\left(1+\frac{2}{3}\frac{\langle r^2(\tau)\rangle}{w_{xy}^2}\right)^{-1}\cdot\left(1+\frac{2}{3}\frac{\langle r^2(\tau)\rangle}{w_{xy}^2}\right)^{-\frac{1}{2}}$$

- **MSD test:**

$$\mathrm{MSD}(\tau)\equiv\langle r^2(\tau)\rangle = \left\langle(\vec{r}(t)-\vec{r}(t+\tau))^2\right\rangle = 2n\cdot\frac{K_\alpha}{\Gamma(1+\alpha)}\cdot\tau^\alpha$$

- **math: blackboard:**

$$\mathbb{ABCDEFGHIJKLMNOPQRSTUVWXYZ}\Bbbk\not\mathbb{=}\Bbbk$$

- **math: bf:**

$$\mathbf{ABCDEFGHIJKLMNOPQRSTUVWXYZ120}$$

- **math: rm:**

$$\mathrm{ABCDEFGHIJKLMNOPQRSTUVWXYZ120}$$

- **math: cal:**

$$\mathcal{ABCDEFGHIJKLMNOPQRSTUVWXYZ}\infty\in\prime$$

- **subscript test:**

$$r_{123} \quad r_{\frac{1}{2}}$$

- **subscript0 test:**

$$r_{123}$$

- **subscript1 test:**

$$r_{123}$$

- **subscript2 test:**

$$r_{123}$$

- **subscript3 test:**

$$r_{123}r_{\frac{1}{2}}$$

- **superscript test:**

$$r^{123} \quad r^{\frac{1}{2}}$$

- **superscript0 test:**

$$r^{123}$$

- **superscript1 test:**

$$r^{123}$$

- **superscript2 test:**

$$r^{123}$$

- **superscript3 test:**

$$r^{123}r^{\frac{1}{2}}$$

- **asuperscript test:**

$$a^{123} \quad a^{\frac{1}{2}}$$

- **asuperscript0 test:**

$$a^{123}$$

- **gsuperscript1 test:**

$$g^{123}$$

- **gsuperscript2 test:**

$$g^{123}$$

- **gsuperscript3 test:**

$$g^{123}g^{\frac{1}{2}}$$

- **frac test:**

$$\frac{a}{b}+\frac{g}{a}-\frac{a^2}{b^2}\cdot\frac{a^2}{b^{\frac{1}{2}}}$$

- **tfrac test:**

$$\tfrac{a}{b}+\tfrac{g}{a}-\tfrac{a^2}{b^2}\cdot\tfrac{a^2}{b^{\dfrac{1}{2}}}$$

- **dfrac test:**

$$\dfrac{a}{b}+\dfrac{g}{a}-\dfrac{a^2}{b^2}\cdot\dfrac{a^2}{b^{\dfrac{1}{2}}}$$

- **stackrel test:**

$$\stackrel{a}{b}+\stackrel{g}{a}-\stackrel{a^2}{b^2}\cdot\stackrel{a^2}{b^{\frac{1}{2}}}$$

- **brace5 test: ( )**

$$\left(\left(\left(r^{123}\right)\right)\right)--\left(\left(\left(r^{123}\right)\right)\right)$$

- **brace6 test: [ ]**

$$\left[\left[\left[r^{123}\right]\right]\right] - - \left[\left[\left[r^{123}\right]\right]\right]$$

- **brace7 test:**

$$\left\{\left\{\left\{r^{123}\right\}\right\}\right\} - - \left\{\left\{\left\{r^{123}\right\}\right\}\right\}$$

- **brace8 test: —— ——**

$$\left\|\left\|\left\|r^{123}\right\|\right\|\right\| - - \left\|\left\|\left\|r^{123}\right\|\right\|\right\|$$

- **brace9 test: — —**

$$\left|\left|\left|r^{123}\right|\right|\right| - - \left|\left|\left|r^{123}\right|\right|\right|$$

- **brace10 test**

$$\left\{\left[\left(r^{123}\right)\right]\right\} - - \left\{\left[\left(r^{123}\right)\right]\right\}$$

- **brace11 test: floor**

$$\left\lfloor\left\lfloor\left\lfloor r^{123}\right\rfloor\right\rfloor\right\rfloor - - \left\lfloor\left\lfloor\left\lfloor r^{123}\right\rfloor\right\rfloor\right\rfloor$$

- **brace12 test: ceil**

$$\left\lceil\left\lceil\left\lceil r^{123}\right\rceil\right\rceil\right\rceil - - \left\lceil\left\lceil\left\lceil r^{123}\right\rceil\right\rceil\right\rceil$$

- **sub-, superscript test**

$$r_{321}^{1234} r_{321}^{1234} - - r_{321}^{1234} r_{321}^{1234} - - \kappa^2 - - \kappa_2 - - \kappa_2^2$$

- **super-, subscript test**

$$r_{4321}^{123} r_{4321}^{123} - - r_{4321}^{123} r_{4321}^{123} - - \kappa^2 - - \kappa_2 - - \kappa_2^2$$

- **math 1:**

$$f(x) = \int_{-\infty}^{x} e^{-t^2}\, \mathrm{d}t$$

- **math 2:**

$$\sum_{i=1}^{\infty} \frac{-e^{i\pi}}{2^n}$$

- **math 3:**

$$\det \begin{pmatrix} 1 & x_1 & \dots & x_1^{n-1} \\ 1 & x_2 & \dots & x_2^{n-1} \\ \vdots & \vdots & \ddots & \vdots \\ 1 & x_n & \dots & x_n^{n-1} \end{pmatrix} = \prod_{1\le i<j\le n} (x_j - x_i)$$

- **math 4:**

$$\sqrt{1+\sqrt{1+\sqrt{1+\sqrt{1+\sqrt{1+\sqrt{1+x}}}}}}$$

- **math 5:**

$$\binom{p}{2} = x^2 y^{p-2} - \frac{1}{1-x}\frac{1}{1-x^2}$$

- **math 6:**

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

- **math 7:**

$$\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) |\varphi(x + \mathrm{i}y)|^2 = 0$$

- **math 8:**

$$2^{2^{2^x}}$$

- **math 9:**

$$\iint_D f(x,y)\, \mathrm{d}x\, \mathrm{d}y$$

- **math 10 (overbrace):**

$$\overbrace{x + x + ... + x}k \text{ times}$$

- **math 11 (underbrace):**

$$\underbrace{x + x + ... + x}{k \text{ times}}$$

- **math 12 (under/overbrace):**

$$\underbrace{\overbrace{x + x + ... + x}{k \text{ times}}\overbrace{x + x + ... + x}{k \text{ times}}}{2k \text{ times}}$$

- **math 13:**

$$y_1'' \quad y_2'''$$

- **math 14:**

$$f(x) = \begin{cases} 1/3 & \text{if } 0 \leq x \leq 1 \\ 2/3 & \text{if } 3 \leq x \leq 4 \\ 0 & \text{elsewhere} \end{cases}$$

- **math 15:**

$$\Re z = \frac{n\pi \dfrac{\theta + \psi}{2}}{\left(\dfrac{\theta + \psi}{2}\right)^2 + \left(\dfrac{1}{2} \log \left|\dfrac{B}{A}\right|\right)^2}.$$

- **math 16:**

$$\sum_{m=1}^{\infty} \sum_{n=1}^{\infty} \frac{m^2\, n}{3^m \left(m\, 3^n + n\, 3^m\right)}$$

- **math 17:**

$$\phi_n(\kappa) = \frac{1}{4\pi^2\kappa^2} \int_0^\infty \frac{\sin(\kappa R)}{\kappa R} \frac{\partial}{\partial R} \left[R^2 \frac{\partial D_n(R)}{\partial R}\right] \, dR$$

- **math 18:**

$${}_pF_q(a_1, \ldots, a_p; c_1, \ldots, c_q; z) = \sum_{n=0}^{\infty} \frac{(a_1)_n \cdots (a_p)_n}{(c_1)_n \cdots (c_q)_n} \frac{z^n}{n!}$$

- **math 19 (overset):**

$$X \overset{=}{\text{def}} Y \qquad X \overset{=}{!} Y \qquad X \vec{f} Y \qquad \frac{f(x+\Delta x)-f(x)}{\Delta x} \overset{\longrightarrow}{\Delta x \to 0} f'(x)$$

- **math 20 (underset):**

$$X \underset{=}{\text{def (5)}} Y \qquad X \underset{\to}{f} Y \qquad \frac{f(x+\Delta x)-f(x)}{\Delta x} \underset{\longrightarrow}{\Delta x \to 0} f'(x)$$

- **axiom of power test:**

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

- **De Morgan's law:** $\neg(P \land Q) \iff (\neg P) \lor (\neg Q)$ or $\overline{\bigcap_{i \in I} A_i} \equiv \bigcup_{i \in I} \overline{A_i}$ or $\overline{A \cup B} \equiv \overline{A} \cap \overline{B}$

- **quadratic formula:**

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

- **combination:**

$$\binom{n}{k} = \frac{n(n-1)...(n-k+1)}{k(k-1)\dots 1} = \frac{n!}{k!(n-k)!}$$

- **Sophomore's dream 1:**

$$\int_0^1 x^{-x}\,dx = \sum_{n=1}^{\infty} n^{-n} (=1.29128599706266354040728259059560054149861936827...)$$

- **Sophomore's dream 2:**

$$\int_0^1 x^{x}\,dx = \sum_{n=1}^{\infty} (-1)^{n+1} n^{-n} = -\sum_{n=1}^{\infty} (-n)^{-n} (=0.78343051071213440705926438652697546940768199014...)$$

- **divergence 1:**

$$\text{div}\,\vec{F} = \nabla \cdot \vec{F} = \frac{\partial U}{\partial x} + \frac{\partial V}{\partial y} + \frac{\partial W}{\partial z}$$

- **divergence 2:**

$$\overrightarrow{\mathrm{div}}\left(\underline{\underline{\epsilon}}\right) = \begin{bmatrix} \frac{\partial \epsilon_{xx}}{\partial x} + \frac{\partial \epsilon_{yx}}{\partial y} + \frac{\partial \epsilon_{zx}}{\partial z} \\ \frac{\partial \epsilon_{xy}}{\partial x} + \frac{\partial \epsilon_{yy}}{\partial y} + \frac{\partial \epsilon_{zy}}{\partial z} \\ \frac{\partial \epsilon_{xz}}{\partial x} + \frac{\partial \epsilon_{yz}}{\partial y} + \frac{\partial \epsilon_{zz}}{\partial z} \end{bmatrix}$$

- **lim, sum ...:**

$$\lim_{x \to \infty} f(x) = \binom{k}{r} + \frac{a}{b} \sum_{n=1}^{\infty} a_n + \left\{ \frac{1}{13} \sum_{n=1}^{\infty} b_n \right\}.$$

- **Schwinger-Dyson:**

$$\left\langle \psi \left| \mathcal{T}\{F \phi^j\} \right| \psi \right\rangle = \left\langle \psi \left| \mathcal{T}\{i F_{,i} D^{ij} - F S_{int,i} D^{ij}\} \right| \psi \right\rangle .$$

- **Schrödinger's equation:**

$$\left[-\frac{\hbar^2}{-2m} \frac{\partial^2}{\partial x^2} + V \right] \Psi(x) = i\hbar \frac{\partial}{\partial t} \Psi(x)$$

- **Cauchy-Schwarz inequality:**

$$\left(\sum_{k=1}^{n} a_k b_k \right)^2 \leq \left(\sum_{k=1}^{n} a_k^2 \right) \left(\sum_{k=1}^{n} b_k^2 \right)$$

- **Maxwell's equations:**

$$\begin{aligned} \nabla \times \vec{\mathbf{B}} - \frac{1}{c} \frac{\partial \vec{\mathbf{E}}}{\partial t} &= \frac{4\pi}{c} \vec{\mathbf{j}} \\ \nabla \cdot \vec{\mathbf{E}} &= 4\pi\rho \\ \nabla \times \vec{\mathbf{E}} + \frac{1}{c} \frac{\partial \vec{\mathbf{B}}}{\partial t} &= \vec{\mathbf{0}} \\ \nabla \cdot \vec{\mathbf{B}} &= 0 \end{aligned}$$