Medium

$$1_A = \begin{cases} 1 & if\ x \subset A \\ 0 & if\ x \notin A \end{cases}$$

$$\underbrace{n \uparrow \ldots \uparrow}_{\mathrm{n}} n = n \to n \to n$$

In the following, note the spacing between the and the 1^1, 2, and 3.

$$1 \uparrow 1 = 1^1 = 1$$

$$2 \uparrow 2 = 2^2 = 4$$

$$3 \uparrow\uparrow\uparrow 3 = 3^{3^3} = 3 \uparrow\uparrow 3 \uparrow\uparrow 3 = \underbrace{3^{3^{3^{3^{\cdot^{\cdot^{\cdot^{3}}}}}}}}_{3^{3^3}\ \mathrm{threes}}$$

$$\frac{d}{dx} f(x) = \lim_{\Delta x \to 0} \frac{f(x + \Delta x) - f(x))}{\Delta x}$$

$$H_2O(l) + H_2O(l) \rightleftharpoons H_3O^+(aq) + H_3O^-(aq)$$

$$\Gamma(n + 1) \stackrel{\mathrm{def}}{=} \int_0^\infty e^{-t} t^n \, dt \quad gcd(n, m, mod \quad n); \quad x \equiv y \mod c; \quad x = y \quad (d)$$

In the following, note the bold symbols.

$\nabla \cdot \mathbf{E} = \frac{\rho}{\varepsilon_0}$

$\nabla \cdot \mathbf{B} = 0$

$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$

$\nabla \cdot \mathbf{E} = \mu_0 \mathbf{J} + \mu_0 \varepsilon_0 \frac{\partial \mathbf{E}}{\partial t}$

$\oiint_{\partial V} \mathbf{E} \cdot d\mathbf{A} = \frac{Q(V)}{\varepsilon_0}$

$\oiint_{\partial V} \mathbf{B} \cdot d\mathbf{A} = 0$

$\oint_{\partial S} \mathbf{E} \cdot d\mathbf{l} = -\frac{\partial \Phi_{B,S}}{\partial t}$

$\oint_{\partial S} \mathbf{B} \cdot d\mathbf{l} = \mu_0 I_S + \mu_0 \varepsilon_0 \frac{\partial \Phi_{E,S}}{\partial t}$

$$\begin{aligned} \rho_\theta &= \begin{pmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{pmatrix} \\ &= \begin{pmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{pmatrix} \cdot \begin{vmatrix} 1 & 0 & \cdots & 0 \\ 0 & * & \cdots & * \\ \vdots & \vdots & \ddots & \vdots \\ 0 & * & \cdots & * \end{vmatrix} \\ &= \begin{vmatrix} 1 & 0 & \cdots & 0 \\ 0 & * & \cdots & * \\ \vdots & \vdots & \ddots & \vdots \\ 0 & * & \cdots & * \end{vmatrix} \end{aligned}$$

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

$$\phi(n) = n \cdot \prod_{\substack{p|n \\ p \text{ prime}}} \left(1 - \frac{1}{p}\right)$$

${}^{4}_{12}C^{5+}_{2}$

${}^{14}_{2}C^{5+}_{2}$

${}^{4}_{12}C^{5+}_{2}$

${}^{14}C^{5+}_{2}$

${}_{2}C^{5+}_{2}$

$Q \stackrel{\sim}{=} \left\{ \frac{a}{b} \middle| a, b \subset Z \qquad b \neq 0 \right\} \Big/ \sim$
$\frac{a}{b} \sim \frac{c}{d} \Longleftrightarrow ad - bc = 0$

$1 \uparrow 1 = {}^{1}1 = 1$
$2 \uparrow\uparrow 2 = {}^{2}2 = 4$

$3 \uparrow\uparrow\uparrow 3 = {}^{3}3 = 3 \uparrow\uparrow 3 \uparrow\uparrow 3 = 3^{3^{3^{3^{3^{\cdot^{\cdot^{\cdot^{3}}}}}}}}$