

1 Symbols

$\forall x \in X, \quad \exists y \leq \epsilon$

2 Operators

$+ - = ! / () [] < > | ' :$
 $\cos(2\theta) = \cos^2 \theta - \sin^2 \theta$
 $\lim_{x \rightarrow \infty} \exp(-x) = 0$
 $a \bmod b$
 $x \equiv a \pmod{b}$

3 Greek letters

$\alpha, A, \beta, B, \gamma, \Gamma, \pi, \Pi, \phi, \varphi, \Phi$

4 Powers and Indices

$k_{n+1} = n^2 + k_n^2 - k_{n-1}$
 n^{22}
 $f(n) = n^5 + 4n^2 + 2|_{n=17}$

5 Fractions

$\frac{n!}{k!(n-k)!} = \binom{n}{k}$
 $\frac{\frac{\frac{1}{x} + \frac{1}{y}}{y-z}}{3/7}$
 $\frac{3/7}{3/7}$

$$\frac{\begin{pmatrix} x_1 x_2 \\ \times (x_1' x_2') \end{pmatrix}}{(y_1 y_2 y_3 y_4)} \tag{1}$$

6 Roots

$\sqrt{\frac{a}{b}}$
 $\sqrt[n]{1+x+x^2+x^3+\dots}$

7 Sums and Integrals

$$\sum_{i=1}^{10}t_i\int_0^\infty\mathrm{e}^{-x}\,\mathrm{d}x$$

$$\Sigma\Pi\Pi\oplus\otimes\odot\cup\cap\uplus\sqcup\vee\wedge\int\oint\iint\iiint\iiiii\int\cdots\int\quad(2)$$

$$\sum_{\substack{0\leq i\leq m\\0\leq j\leq n}}P(i,j)\\ \int\limits_a^b$$

8 Brackets, braces and delimiters

$$(a), [b], \{c\}, |d|, \|e\|, \langle f \rangle, \lfloor g \rfloor, \lceil h \rceil, \ulcorner i \urcorner \\ \left(\frac{x^2}{y^3}\right) \\ P\left(A=2\left|\frac{A^2}{B}>4\right.\right) \\ \left\{\frac{x^2}{y^3}\right\} \\ \left.\frac{x^3}{3}\right|_0^1 \\ ((((((\\ \frac{\mathrm{d}}{\mathrm{d}x}(kg(x)) \\ \frac{\mathrm{d}}{\mathrm{d}x}(kg(x))$$

9 Intervals

$$\begin{array}{l}x\in]-1,1[\\x\in\,]-1,1[\\x\in\,]-1,1[\\\end{array}$$

10 Matrices

$$\begin{array}{rcl}a&b&c\\d&e&f\\g&h&i\end{array}\qquad\begin{array}{rcl} -1&3&[r]-1\quad3\\2&-4&2\quad-4\end{array}\qquad\begin{array}{c|c}1&2\\3&4\end{array}$$

$$A_{m,n} = \begin{pmatrix} a_{1,1} & a_{1,2} & \cdots & a_{1,n} \\ a_{2,1} & a_{2,2} & \cdots & a_{2,n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m,1} & a_{m,2} & \cdots & a_{m,n} \end{pmatrix}$$

$$M = \begin{bmatrix} \frac{5}{6} & \frac{1}{6} & 0 \\ \frac{5}{6} & 0 & \frac{1}{6} \\ 0 & \frac{5}{6} & \frac{1}{6} \end{bmatrix}$$

$$M = \begin{matrix} & x & y \\ \begin{matrix} A \\ B \end{matrix} & \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \end{matrix}$$

A matrix in text must be set smaller: $\left(\begin{smallmatrix} a & b \\ c & d \end{smallmatrix}\right)$ to not increase leading in a portion of text.

11 Text in equations

$50apples \times 100apples = lotsofapples^2$
 $50apples \times 100apples = lots\ of\ apples^2$
 $50\ apples \times 100\ apples = lots\ of\ apples^2$
 $50\ apples \times 100\ \mathbf{apples} = lots\ of\ apples^2$

12 Accents

$a' a' a'' a'' \hat{a} \hat{a} \bar{a} \bar{a} \grave{a} \grave{a} \acute{a} \acute{a} \grave{a} \ddot{a} \ \mu \ \mu \ \grave{a} \overrightarrow{AB} \overrightarrow{AB} \overleftarrow{AB} \overleftarrow{AB} \ a''' a''' a'''' a'''' \overline{\overline{aaaaaa}} \check{a} \check{a} \grave{a} \ddot{a} \grave{\grave{a}} [3] \grave{\grave{a}} [3] \widehat{\widehat{AAAAAA}} \widehat{\widehat{AAAAAA}}$

13 Plusminus sign

\pm
 \mp

14 Inline and Displayed Formulas

$$x = \frac{1+y}{1+2z^2}$$

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$$\int_0^\infty e^{-x^2} dx = \frac{\sqrt{\pi}}{2}$$

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$$\frac{1}{1+\frac{1}{2+\frac{1}{3+x}}}+\frac{1}{1+\frac{1}{2+\frac{1}{3+x}}}$$

15 Spaces and Text in Formulas

$$\sqrt{2}\sin x,\sqrt{2}\sin x\\ \iint f(x,y)\,\mathrm{d}x\mathrm{d}y$$

$$\iint\limits_{\mathbf{x}\in\mathbf{R}^2}\langle\mathbf{x},\mathbf{y}\rangle\,d\mathbf{x}$$

$$x_1=a+b \text{ and } x_2=a-b$$

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$$\begin{aligned} (3) \qquad y &= x^4+4 \\ &= (x^2+2)^2-4x^2 \\ &\leq (x^2+2)^2 \end{aligned}$$

$$\begin{aligned} e^x \quad \approx \quad & 1+x+x^2/2!+ \\ & +x^3/3!+x^4/4!+ \\ & +x^5/5! \end{aligned}$$

$$\begin{aligned} w+x+y+z=\\ a+b+c+d+e+\\ +f+g+h+i \end{aligned}$$

$$\begin{aligned} x &= \sin \alpha = \cos \beta \\ &= \cos(\pi - \alpha) = \sin(\pi - \beta) \end{aligned}$$

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16 Formula Numbering

$$x = y + 3 \tag{4}$$

In equation (7) we saw ...

...

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$$\begin{aligned} \int 1 &= x + C \\ \int x &= \frac{x^2}{2} + C \\ \int x^2 &= \frac{x^3}{3} + C \end{aligned} \tag{6}$$

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17 Braces

$$]0, 1[+ \lceil x \rceil - \langle x, y \rangle$$

$$\binom{n+1}{k} = \binom{n}{k} + \binom{n}{k-1}$$

$$|x| = \begin{cases} -x & \text{if } x < 0 \\ x & \text{otherwise} \end{cases}$$

$$F(x,y)=0 \quad \text{and} \quad \begin{vmatrix} F''_{xx} & F''_{xy} & F'_x \\ F''_{yx} & F''_{yy} & F'_y \\ F'_x & F'_y & 0 \end{vmatrix} = 0$$

$$\underbrace{n(n-1)(n-2)\dots(n-m+1)}_{\text{total of } m \text{ factors}}$$

18 Accents

$$\hat{x}, \check{x}, \tilde{a}, \bar{\ell}, \dot{y}, \ddot{y}, \vec{z_1}, \vec{z_1}$$
$$\hat{T} = \hat{T}, \bar{T} = \overline{T}, \widetilde{xyz}, \overbrace{a+b+c+d}$$
$$\overline{a^2 + \underline{xy} + \overline{\overline{z}}}$$
$$\underbrace{a + \overbrace{b + \cdots}^{=t} + z}_{\text{total}} \quad a + \overbrace{b + \cdots}^{126} + z$$