1 Sums and Limits

mathclap & friends

$$X = \sum_{1\le i\le j\le n} X_{ij}$$

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Cramped

$$x^2 \leftrightarrow x^2 \quad x^2 \leftrightarrow x^2$$

Smashoperator

$$V = \sum_{1\le i\le j\le n}^{\infty} V_{ij} \quad X = \sum_{1\le i\le j\le n}^{3456} X_{ij} \quad Y = \sum_{1\le i\le j\le n} Y_{ij} \quad Z = \mathop{T}_{1\le i\le j\le n} Z_{ij}$$

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Adjustlimits

$$\text{a)}\ \lim_{n\to\infty}\max_{p\ge n} \quad \text{b)}\ \lim_{n\to\infty}\max_{p^2\ge n} \quad \text{c)}\ \lim_{n\to\infty}\sup_{p^2\ge nK} \quad \text{d)}\ \limsup_{n\to\infty}\max_{p\ge n}$$

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2 Tags

$$a = b \qquad \text{Q\&A}$$

See **??** *or is it better with* **???** *In the star form* `\ref*` *becomes* **??***eq:example* (`\refeq*` *is not defined).*

$$a = b \qquad \text{Q\&A}$$

$$a = b \qquad [\mathbf{Q\&A}]$$

Normal tags.

$$a = a \tag{1}$$

That was equation (**??**).

OK tags.

$$a = a \tag{**2**}$$

That was equation [**??**], but recall [**??**]

odd tag.

$$a = a \tag{3}$$

That was equation {**??**}, but recall {**??**} and {**??**}.

weird tag.

$$b = b \tag{(4)}$$

That was equation ((**??**)), but recall ((**??**)), ((**??**)) and ((**??**)).

Normal tags again.

$$c = c \tag{5}$$

Non-textual

$$d = d \tag{nth}$$

That was equation (**??**), but recall (**??**), (**??**), (**??**), (**??**) and (**??**).

$$a = a \tag{6}$$

$$b = b \tag{**}$$

This should refer to the equation containing $a = a$: (**??**). Then a switch of tag forms.

$$c = c \tag{7}$$

$$d = d \tag{8}$$

This should refer to the equation containing $d = d$: (**??**) (but recall (**??**)).

$$e = e \tag{9}$$

$$f = f \tag{10}$$

$$1 + 1 = 2$$

$$2 + 2 = 4$$

Blabla (**??**).

3 Arrows

$$A \xLeftarrow[under]{over} B \xRightarrow[under]{over} C$$

$$x \xleftrightarrow[under]{overloooooooong} y \xLeftrightarrow[underloooooooooong]{over} z$$

$$x \xhookleftarrow[bar]{foo} y \xhookrightarrow[bluuuuuuuuub]{baz} t \xmapsto{heeereee} k$$

$$k \xleftharpoonup[.]{} l \xleftharpoondown{..} m \xrightharpoondown[...]{} n \xrightharpoonup{....} o$$

$$x \xrightleftharpoons{bluuuuub} y \xleftrightharpoons[blaaaaaab]{} z$$

$$z = \overbrace{\underbracket{x}_{\text{real}} +i \underbracket{y}_{\text{imaginary}}}^{\text{complex number}} \qquad \underbrace{1+1}_{=2}$$

4 Matrices

$$\begin{array}{cc} c & cocococococo \\ c & c \end{array}$$

$$\begin{array}{ll} lalalalalala & l \\ l & l \end{array}$$

$$\begin{array}{rr} rererererere & r \\ r & r \end{array}$$

$$\begin{pmatrix} pppppppp & foo \\ l & ppppppppppppppppp \end{pmatrix}$$

$$\begin{bmatrix} b & b \\ b & b \end{bmatrix}$$

$$\left\{\begin{array}{lr} B & B \\ B & BBBBBBBrBBBBBB \end{array}\right\}$$

$$\begin{vmatrix} v & v \\ v & v \end{vmatrix}$$

$$\left\|\begin{array}{cc} V & V \\ VVVVVVcVVVVVV & bar \end{array}\right\|$$

$$\left| \begin{smallmatrix} a & blblblbllbblblblblblblbl \\ c & d \end{smallmatrix} \right|$$

$$\left[\begin{smallmatrix} a & -b \\ -c & d \end{smallmatrix} \right] \left[\begin{smallmatrix} a & -b \\ -c & d \end{smallmatrix} \right]$$

$$\left\| \begin{smallmatrix} e & -f \\ -g & h \end{smallmatrix} \right\| \left\| \begin{smallmatrix} e & -f \\ -g & h \end{smallmatrix} \right\|$$

$$\left[\begin{smallmatrix} a & -bbbbb \\ -c & d \end{smallmatrix} \right] \left[\begin{smallmatrix} a & -bbbbb \\ -c & d \end{smallmatrix} \right]$$

$$\left\| \begin{smallmatrix} e & -fffff \\ -g & h \end{smallmatrix} \right\| \left\| \begin{smallmatrix} e & -fffff \\ -g & h \end{smallmatrix} \right\|$$

$$\left[\begin{smallmatrix} a & -bbbbb \\ -c & d \end{smallmatrix} \right] \left[\begin{smallmatrix} a & -bbbbb \\ -c & d \end{smallmatrix} \right]$$

$$\left\| \begin{smallmatrix} e & -fffff \\ -g & h \end{smallmatrix} \right\| \left\| \begin{smallmatrix} e & -fffff \\ -g & h \end{smallmatrix} \right\|$$

5 Cases

$$\begin{cases} E = mc^2 & \text{Nothing to see here} \\ \int x - 3\,dx & \text{Integral is text style} \end{cases}$$

$$\begin{cases} E = mc^2 & c \approx 3.00 \times 10^8\,\mathrm{m/s} \\ \displaystyle\int x - 3\,dx & \text{Integral is display style} \end{cases}$$

$$a = \begin{cases} E = mc^2 & \text{Nothing to see here (text in math)} \\ \displaystyle\int x - 3\,dx & \text{Integral is display style (text in math)} \end{cases}$$

$$\left.\begin{array}{ll} E = mc^2 & 5^6 \quad \text{and so on} \\ \int x - 3\,dx & \int x\,dx \end{array}\right\} = b$$

$$\left.\begin{array}{ll} x^2 & \text{for } \int x\,dx > 0 \\ x^3 & \text{else} \end{array}\right\} \Rightarrow \cdots$$

$$\left.\begin{array}{ll} E = mc^2 & 5^6 \quad \text{and so on} \\ \displaystyle\int x - 3\,dx & \displaystyle\int x\,dx \end{array}\right\} = b$$

$$\left.\begin{array}{ll} x^2 & \text{for } \int x\,dx > 0 \\ \displaystyle\int x^3\,x & \text{else} \end{array}\right\} \Rightarrow \cdots$$

$$\mathrm{foo} = \begin{cases} \pi & \text{if something} \\ \int \Omega^{\Xi}\,\Omega & \text{otherwise} \end{cases}$$

6 Gathered

$$A = \boxed{\begin{array}{c}\text{first}\\ \text{last}\end{array}} B$$

$$a = b + c$$
$$b = c + d$$
$$\dots$$
$$\boxed{hello}$$

$$\boxed{f(x) = \int h(x)\,dx}$$
$$= g(x)$$

$$a = b \tag{11}$$

Some text

$$c = d \tag{12}$$

Some short text

$$e = f \tag{13}$$

7 Delimiters

$$|\frac{a}{c}| \quad \left|\frac{a}{c}\right| \quad \left|\frac{a}{b}\right|$$

$$|\frac{a}{b}| \quad \left|\frac{a}{b}\right| \quad |\frac{a}{b}| \quad \left|\frac{a}{b}\right|$$

$$|\pi| \quad |\_\phi\_|$$

$$\left\langle A, \frac{1}{2} \right\rangle \quad \left\langle B \middle| \sum_k f_k \middle| C \right\rangle$$

$$\left\{ x \in X \middle| \frac{\sqrt{x}}{x^2+1} > 1 \right\}$$

$$\langle 1 \,|\, \tfrac{8}{\frac{4}{1}} \,|\, 3 \rangle \quad \left\langle 1 \middle| \tfrac{8}{\frac{4}{1}} \middle| 3 \right\rangle \quad \langle 1 \,|\, \tfrac{8}{\frac{4}{1}} \,|\, 3 \rangle$$

$$\left(\frac{\pi}{\omega}\right) \cdot \left[\int x dx\right] \dots [\sqrt{\frac{\sin x}{\cos z}}] \cdots (\frac{\frac{foo}{bar}}{\frac{baz}{qux}})$$

Operators

$$a := b \quad a :=: b \quad a :=: b$$

$$a \coloneqq b \quad c ::\approx d \quad e :: f$$

$$\bigtimes \times \doublebarwedge \otimes \bigotimes$$

8 Prescripts

$$ {}^{4}_{12}\mathbf{C}^{5+}_{2} \quad {}^{14}_{2}\mathbf{C}^{5+}_{2} \quad {}^{4}_{12}\mathbf{C}^{5+}_{2} \quad {}^{14}\mathbf{C}^{5+}_{2} \quad {}_{2}\mathbf{C}^{5+}_{2} $$

$$ {}^{A}_{\mathbf{Z}}\mathrm{X} \to {}^{A-4}_{\mathbf{Z-2}}\mathrm{Y} + {}^{4}_{\mathbf{2}}\alpha $$

$$ a = \frac{\begin{array}{r} xy + xy + \int xy\,\mathrm{dx} + xy + xy \\ + xy + xy + xy + xy \end{array}}{z} = \frac{\begin{array}{r} xy + xy + \int xy\,\mathrm{dx} + xy + xy \\ + xy + xy + xy + xy \end{array}}{z} $$

9 Multlines

$$ \begin{aligned} p(x) &= 3x^6 + 14x^5y + 590x^4y^2 + 19x^3y^3 \\ &\quad - 12x^2y^4 - 12xy^5 + 2y^6 - a^3b^3 \end{aligned} $$

$$ A = \boxed{first} \quad B \\ \boxed{last} $$

$$ A = \begin{array}{c} \boxed{first} \\ \boxed{last} \end{array} B $$

$$ A = \begin{array}{c} \boxed{first} \\ \boxed{last} \end{array} B $$

$$ A = \begin{array}{c} \boxed{first} \\ \boxed{last} \end{array} B $$

$$ A = \boxed{first} \qquad\qquad \begin{array}{c} \\ \boxed{last} \end{array} B $$

$$A = \boxed{first}$$

$$A = \boxed{first} \qquad B \qquad \boxed{last}$$

$$A = \begin{matrix}\boxed{first}\\ \\ \boxed{last}\end{matrix} B$$

$$A = \frac{\boxed{first}}{\boxed{last}} B$$

$$\begin{aligned} foo ::= x = 1, \quad & x + 1 = 2 \\ & y = 2 \end{aligned} \tag{14}$$

$$\begin{aligned} & x = 1, \quad x + 1 = 2 \\ bar ::= \quad & y = 2 \end{aligned} \tag{15}$$

10 Spread-lines

Spread it

$$\begin{matrix} a & b & c \\ d & e & f \\ g & h & i \end{matrix}$$

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

$$\begin{matrix} a & b \\ c & d \end{matrix}$$

$$\begin{cases} n/2 & \text{if } n \text{ is even} \\ -(n+1)/2 & \text{if } n \text{ is odd} \end{cases}$$

$$\begin{aligned} a &= b + c - d \\ &\quad + e - f \\ &= g + h \\ &= i \end{aligned} \tag{16}$$

$$a + b + c + d + e + f \\ + i + j + k + l + m + n \tag{17}$$

$$a = b \tag{18}$$

$$c = d \tag{19}$$

$$a_1 = b_1 + c_1 \tag{20}$$

$$a_2 = b_2 + c_2 - d_2 + e_2 \tag{21}$$

$$a_{11} = b_{11} \qquad a_{12} = b_{12}$$

$$a_{21} = b_{21} \qquad a_{22} = b_{22} + c_{22}$$

$$x = y_1 - y_2 + y_3 - y_5 + y_8 - \dots \quad \text{by foo} \tag{22}$$

$$= y' \circ y^* \quad \text{by baz} \tag{23}$$

$$= y(0)y' \quad \text{by Axiom 1.} \tag{24}$$

$$\left.\begin{aligned} B' &= -\partial \times E, \\ E' &= \partial \times B - 4\pi j, \end{aligned}\right\} \quad \text{Maxwell's equations}$$

$$\left(\begin{smallmatrix} a & b \\ c & d \end{smallmatrix}\right)$$

$$\left(\begin{smallmatrix} a & b \\ c & d \end{smallmatrix}\right)$$

$$\sum_{\substack{i \in \Lambda \\ 0 < j < n}} P(i,j)$$

$$y = ax^2 + bx + c \tag{25}$$

$$f(x) = x^2 + 2xy + y^2 \tag{26}$$

$\boxed{Firstline}$

$\boxed{Secondline}$

$L + E + F + T$

$R + I + G + H + T$

$L + E + F + T$

$R + I + G + H + T$

$\boxed{WupWup}$

$\boxed{Lastline}$

11 Stepped lines

$$\begin{aligned} 1* \quad & x = 1, \quad x + 1 = 2 \quad \textbf{over} \\ 2* \quad & \qquad\qquad y = 2 \quad \textbf{over} \end{aligned}$$

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$$\begin{aligned} &\text{See:} s = 2.8, \quad s + 0.2 = 3 \text{the end} \\ &\text{See:} t \quad = \quad 4.5 \text{the} \quad \text{end} \end{aligned}$$

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12 Shifting equations

$$\begin{aligned} &\boxed{\text{Part 1}} \\ =\ &\boxed{\text{2nd line}} \\ 19 + \ &\boxed{\text{last part}} \end{aligned}$$

$$\Updownarrow \quad \begin{aligned} \boxed{1} &= \boxed{2} && (27) \\ \boxed{3} &= \boxed{4} && (28) \end{aligned}$$

$$\begin{aligned} a &= b \\ &\vdots \\ &= c \\ &\vdots \\ &= d \end{aligned}$$