

# **Manuscript Preparation in L<sup>A</sup>T<sub>E</sub>X**

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## Math examples

Example 1: (EQUATION)

$$\mathbf{P} = \lim_{\Delta v \rightarrow 0} \varepsilon \left[ \frac{1}{\Delta v} \sum_{i=1}^{N_e \Delta v} d\mathbf{p}_i \right] = N_e d\mathbf{p}_{av} = N_e Q l_{av} \quad (1) \quad \text{eqn1}$$

Example 2: (EQUATION\*)

$$\mathbf{P} = \lim_{\Delta v \rightarrow 0} \left[ \frac{1}{\Delta v} \sum_{i=1}^{N_e \Delta v} d\mathbf{p}_i \right] = N_e d\mathbf{p}_{av} = N_e Q l_{av}, :: ?!$$

Example 3: (EQNARRAY)

$$\mathbf{P} = ab + bc \quad \lim_{\Delta v \rightarrow 0} \left[ \frac{1}{\Delta v} \sum_{i=1}^{N_e \Delta v} d\mathbf{p}_i \right] = N_e d\mathbf{p}_{av} = N_e Q l_{av}$$

$$\mathbf{P} = ab + bc \quad \lim_{\Delta v \rightarrow 0} \left[ \frac{1}{\Delta v} \sum_{i=1}^{N_e \Delta v} d\mathbf{p}_i \right] = N_e d\mathbf{p}_{av} = N_e Q l_{av} \quad (2) \quad \text{Missing}$$

$$= ab + bc \quad \lim_{\Delta v \rightarrow 0} \left[ \frac{1}{\Delta v} \sum_{i=1}^{N_e \Delta v} d\mathbf{p}_i \right] = N_e d\mathbf{p}_{av} = N_e Q l_{av} \quad (3) \quad \text{Missing}$$

Example 4: (EQNARRAY\*)

$$\mathbf{P} = \lim_{\Delta v \rightarrow 0} \left[ \frac{1}{\Delta v} \sum_{i=1}^{N_e \Delta v} d\mathbf{p}_i \right] = N_e d\mathbf{p}_{av} = N_e Q l_{av}$$

$$\mathbf{P} = \lim_{\Delta v \rightarrow 0} \left[ \frac{1}{\Delta v} \sum_{i=1}^{N_e \Delta v} d\mathbf{p}_i \right] = N_e d\mathbf{p}_{av} = N_e Q l_{av}$$

$$= \lim_{\Delta v \rightarrow 0} \left[ \frac{1}{\Delta v} \sum_{i=1}^{N_e \Delta v} d\mathbf{p}_i \right] = N_e d\mathbf{p}_{av} = N_e Q l_{av}$$

Example 5: (ALIGN)

$$z = x + y \quad z = x + y \quad (4) \quad \text{Missing}$$

$$= z + y \quad x = z + y$$

$$a = b + c \quad a = b + c \quad (5) \quad \text{Missing}$$

$$= z + y \quad x = z + y$$

$$b = b + c \quad a = b + c \quad (6) \quad \text{Missing}$$

$$c = b + c \quad a = b + c \quad (7) \quad \text{Missing}$$

$$d = b + c \quad a = b + c^{\S} \quad (8) \quad \text{Missing}$$

$$e = b + c \quad a = b + c \quad (9) \quad \text{Missing}$$

Example 6: (ALIGN\*)

$$\begin{array}{ll} z = x + y & z = x + y \\ = z + y & x = z + y \\ a = b + c & a = b + c \end{array}$$

Example 7: (GATHER)

$$\begin{array}{l} \mathbf{P} = \lim_{\Delta v \rightarrow 0} \left[ \frac{1}{\Delta v} \sum_{i=1}^{N_e \Delta v} d\mathbf{p}_i \right] = N_e d\mathbf{p}_{av} = N_e Q l_{av} \\ \mathbf{P} = \lim_{\Delta v \rightarrow 0} \left[ \frac{1}{\Delta v} \sum_{i=1}^{N_e \Delta v} d\mathbf{p}_i \right] = N_e d\mathbf{p}_{av} = N_e Q l_{av} \end{array} \quad (10) \quad \text{Missing}$$

Example 8: (GATHER\*)

$$\begin{array}{l} \mathbf{P} = \lim_{\Delta v \rightarrow 0} \left[ \frac{1}{\Delta v} \sum_{i=1}^{N_e \Delta v} d\mathbf{p}_i \right] = N_e d\mathbf{p}_{av} = N_e Q l_{av} \\ \mathbf{P} = \lim_{\Delta v \rightarrow 0} \left[ \frac{1}{\Delta v} \sum_{i=1}^{N_e \Delta v} d\mathbf{p}_i \right] = N_e d\mathbf{p}_{av} = N_e Q l_{av} \end{array}$$

Example 9: (ALIGNAT)

$$\begin{array}{ll} x = y_1 - y_2 + y_3 - y_5 + y_8 - \dots & \text{by Axiom 1.} \\ = y' \circ y^* & \text{by Axiom 2.} \\ = y(0)y' & \text{by Axiom 3.} \end{array} \quad (11) \quad \text{Missing}$$

Example 10: (ALIGNAT\*)

$$\begin{array}{ll} x = y_1 - y_2 + y_3 - y_5 + y_8 - \dots & \text{by Axiom 1.} \\ = y' \circ y^* & \text{by Axiom 2.} \\ = y(0)y' & \text{by Axiom 3.} \end{array}$$

Example 11: (ALIGNED inside EQUATION)

$$\left. \begin{array}{l} B' = -\partial \times E, \\ = -\partial \times Z, \\ E' = \partial \times B - 4\pi j, \end{array} \right\} \quad \text{Maxwell's equations} \quad (12) \quad \text{Missing}$$

Example 12: (ALIGNED inside EQUATION\*)

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

Example 13: (SUBARRAY inside EQUATION)

$$\sum_{\substack{i \in \Lambda \\ 0 < j < n}} P(i, j) = \partial \times B - 4\pi j, \quad (13) \quad \text{Missing}$$

Example 14: (SUBARRAY inside EQUATION)

$$\sum_{\substack{i \in \Lambda \\ 0 < j < n}} P(i, j) = \partial \times B - 4\pi j, \quad (14) \quad \text{Missing}$$

Example 15: (FLALIGN)

$$\begin{array}{l} a_{11} = b_{11} \\ a_{21} = b_{21} \\ \quad = b_{21} \end{array} \qquad \begin{array}{l} a_{12} = b_{12} \\ a_{22} = b_{22} + c_{22} \\ a_{22} = b_{22} + c_{22} \end{array} \quad \begin{array}{l} (15) \quad \text{Missing} \\ (16) \quad \text{Missing} \end{array}$$

Example 16: (FLALIGN\*)

$$\begin{array}{l} a_{11} = b_{11} \\ a_{21} = b_{21} \\ \quad = b_{21} \end{array} \qquad \begin{array}{l} a_{12} = b_{12} \\ a_{22} = b_{22} + c_{22} \\ a_{22} = b_{22} + c_{22} \end{array}$$

Example 17: (MULTILINE)

$$\begin{array}{l} a + b + c + d + e + f \\ \\ a + b + c + d + e + f \\ a + b + c + d + e + f \\ \\ + i + j + k + l + m + n \end{array} \quad (17) \quad \text{Missing}$$

Example 18: (MULTILINE\*)

$$\begin{array}{l} a + b + c + d + e + f \\ \\ a + b + c + d + e + f \\ a + b + c + d + e + f \\ \\ + i + j + k + l + m + n \end{array}$$

Example 19: (CASES within EQUATION)

$$\left\{ \begin{array}{ll} x = 2 & x - 2 \\ x = 2 & x - 2 \\ & x - 2 \end{array} \right. \quad (18) \quad \text{Missing}$$

Example 20: (CASES within EQUATION\*)

$$\left\{ \begin{array}{ll} x = 2 & x - 2 \\ x = 2 & x - 2 \\ & x - 2 \end{array} \right.$$

Example 21: (bmatrix within EQUATION)

$$\alpha + \gamma_2 = \begin{bmatrix} 1 & 2 - 3 & a + b \\ 1 & 2 - 3 & c + d \\ 1 & 2 - 3 & c + d \end{bmatrix} \quad (19) \quad \text{Missing}$$

Example 22: (BMatrix within EQUATION)

$$\alpha + \gamma_2 = \left\{ \begin{array}{lll} 1 & 2 - 3 & a + b \\ 1 & 2 - 3 & c + d \\ & 2 - 3 & c + d \end{array} \right\}$$

Example 23: (vmatrix within EQUATION)

$$\alpha + \gamma_2 = \left| \begin{array}{lll} 1 & 2 - 3 & a + b \\ 1 & 2 - 3 & c + d \\ 1 & 2 - 3 & c + d \end{array} \right|$$

Example 24: (Vmatrix within EQUATION)

$$\alpha + \gamma_2 = \left\| \begin{array}{lll} 1 & 2 - 3 & a + b \\ 1 & 2 - 3 & c + d \\ 1 & 2 - 3 & c + d \end{array} \right\|$$

Example 25: (pmatrix within EQUATION)

$$\alpha + \gamma_2 = \left( \begin{array}{lll} 1 & 2 - 3 & a + b \\ 1 & 2 - 3 & c + d \\ 1 & 2 - 3 & c + d \end{array} \right)$$

Example 26: (SUBEQUATIONS with EQNARRAY)

$$\mathbf{P} = \lim_{\Delta v \rightarrow 0} \left[ \frac{1}{\Delta v} \sum_{i=1}^{N_e \Delta v} d\mathbf{p}_i \right] = N_e d\mathbf{p}_{av} = N_e Q l_{av}$$

$$\mathbf{P} = \lim_{\Delta v \rightarrow 0} \left[ \frac{1}{\Delta v} \sum_{i=1}^{N_e \Delta v} d\mathbf{p}_i \right] = N_e d\mathbf{p}_{av} = N_e Q l_{av} \quad (20a) \quad \text{Missing}$$

$$\mathbf{P} = \lim_{\Delta v \rightarrow 0} \left[ \frac{1}{\Delta v} \sum_{i=1}^{N_e \Delta v} d\mathbf{p}_i \right] = N_e d\mathbf{p}_{av} = N_e Q l_{av} \quad (20b) \quad \text{Missing}$$

Example 27: (SPLIT within EQUATION)

$$\begin{aligned} x &= x \\ x + y &= 2 \\ &= \infty \end{aligned} \quad (21) \quad \text{Missing}$$

Example 28:

$$\text{int with side limits - msup: } \int^A A + B + C + \cdots + Z$$

Example 29:

$$\text{int with side limits - msub: } \int_A A, B, C, \dots, Z$$

Example 30:

$$\text{int with side limits - msubsup: } \int_A^B A + B + C + \cdots + Z$$

Example 31:

$$\text{sum with limits - munder: } \sum_A A, B, C, \dots, Z$$

Example 32:

$$\text{sum with limits - mover: } \sum^b$$

Example 33:

$$\text{sum with limits - munderover: } \int_A^b$$

Example 34:

$$\text{underline: } \underline{b + c = d}$$

Example 35:

$$\text{underline: } \underline{b + c + z = y}$$

Example 36:

$$\text{underbrace: } \underbrace{a + b = c^2 + y_2(a^2)^2}$$

Example 37:

$$\text{underrightarrow - use accentunder=false attribute: } \underline{\underline{a + b_c + y}}$$

Example 38:

$$\text{underleftarrow - use accentunder=false attribute: } \overleftarrow{a + b_c + y}$$

Example 39:

$$\text{underleftrightharpoonow - use accentunder=false attribute: } \overleftrightarrow{a + b_c + y}$$

Example 41:

$$\text{overline - use accent=true and entity \&OverBar;: } \overline{(a + b = c)}$$

Example 42:

$$\text{overbrace - use accent=true and entity \&OverBrace;: } \overbrace{a + b + c}$$

Example 43:

overrightarrow - use accent=true and entity &c.rarrab;:  $\overrightarrow{a+b+c}$   $\vec{a}$

Example 44:

overleftarrow - use accent=true and entity &c.larrab;:  $\overleftarrow{a+b+c}$

Example 45:

overleftrightarrow - use accent=true and entity &c.lrarrab;:  $\overleftrightarrow{a+b+c}$

Example 47: (ARRAY within EQUATION)

$$\sum_{i=1}^1 \alpha + \gamma_2 = 1 \quad \begin{array}{cc} 2-3 & a+b \\ 2-3 & c+d \\ 2-3 & c+d \end{array} \quad (22) \quad \text{Missing}$$

Example 48: (SPLIT within EQUATION\*)

$$\begin{aligned} x &= x \\ x + y &= 2 \\ &= \infty \end{aligned}$$

Example 49:

$$\begin{array}{r} 11 \quad \text{(carried)} \\ 11101 \\ + \quad \underline{10111} \\ \hline 01011 \end{array}$$

Example 50:

$$= 2 \cos(2 \cdot \underbrace{327}_{\text{average frequency}} \pi t) \cos(\underbrace{130}_{\text{beats per second}} \pi t)$$

Example for overset option

$$L_s = \mu_1 h = \mu_1 = \frac{BW}{\omega_o \sqrt{\mu_2 \epsilon_2}} = \frac{\mu_1}{\sqrt{\mu_2 \epsilon_2}} \quad (23) \quad \text{Missing}$$

$$\left(\frac{BW}{\omega_o}\right) \overbrace{a+b}^{\quad} \underset{B}{=} \left(\frac{BW}{\omega_o}\right) \overset{a}{\underset{B}{=}} \left(\frac{BW}{\omega_o}\right) \overset{\mu_1=\mu_2}{=} \left(\frac{BW}{\omega_o}\right) \overbrace{\quad}^{\mu_1=\mu_2} \underset{B}{=} \left(\frac{BW}{\omega_o}\right) \quad (24) \quad \text{Missing}$$

$$\begin{array}{l}
 A \xleftarrow[\text{under}]{\text{this way}} B \\
 B \xrightarrow[\text{or that way}]{\text{over}} C \\
 a \xleftarrow[\text{under}]{\text{over}} b \\
 A \xleftarrow[\text{under}]{\text{over}} B \\
 B \xrightarrow[\text{under}]{\text{over}} C \\
 C \xleftarrow[\text{under}]{\text{over}} D \\
 E \xrightarrow[\text{under}]{\text{over}} F \\
 F \xrightarrow[\text{under}]{\text{over}} G \\
 H \xrightarrow[\text{under}]{\text{over}} I \\
 I \xrightarrow[\text{under}]{\text{over}} J \\
 J \xleftarrow[\text{under}]{\text{over}} K \\
 K \xrightarrow[\text{under}]{\text{over}} L \\
 L \xleftarrow[\text{under}]{\text{over}} M \\
 M \xrightarrow[\text{under}]{\text{over}} N
 \end{array}
 \tag{25} \quad \text{Missing}$$

Subordinate equation numbering Maxwell's equations:

$$B' = -\nabla \times E, \tag{26a} \quad \text{Missing}$$

$$E' = \nabla \times B - 4\pi j, \tag{26b} \quad \text{Missing}$$

$$\begin{array}{l}
 A = \left( \int_t XXX \right. \\
 \left. YYY \dots \right)
 \end{array}
 \tag{27} \quad \text{Missing}$$

$$\boxed{x^2 + y^2 = z^2} \tag{28} \quad \text{Missing}$$

$$\lim_{a \rightarrow \infty} \frac{1}{a} \tag{29} \quad \text{Missing}$$

$$\lim_{a \rightarrow \infty} \frac{1}{a} \tag{30} \quad \text{Missing}$$

$$\int_a^b x^2 dx + \int_a^b x^2 dx + \lim_{a \rightarrow 0} \frac{1}{a} \tag{31} \quad \text{Missing}$$

$$\sum' C_n = \sum_{n=1}' C_n = \sum_{n=1}' C_n = {}^b \sum_c^d = \sum_{n=1}' C_n \tag{32} \quad \text{Missing}$$



$$\prod_{\substack{1 \leq i \leq n \\ 1 \leq j \leq m}} M_{i,j} \quad (33) \quad \text{Missing}$$

$$x = a_0 + \frac{1}{a_1 + \frac{1}{a_2 + \frac{1}{a_3 + a_4}}} \quad (34) \quad \text{Missing}$$

$$x = a_0 + \frac{1}{a_1 + \frac{1}{a_2 + \frac{1}{a_3 + a_4}}} \quad (35) \quad \text{Missing}$$

$$A \stackrel{!}{=} B; A \stackrel{!}{=} B \quad (36) \quad \text{Missing}$$

$$\lim_{x \rightarrow 0} \frac{e^x - 1}{2x} \stackrel{\left[\frac{0}{0}\right]}{=} \lim_{x \rightarrow 0} \frac{e^x}{2} = \frac{1}{2} \quad (37) \quad \text{Missing}$$

$$z = \overbrace{\underbrace{x}_{\text{real}} + i \underbrace{y}_{\text{imaginary}}}^{\text{complex number}} \quad (38) \quad \text{Missing}$$

$$y = a + f(\underbrace{bx}_{\geq 0 \text{ by assumption}}) = a + f(\underbrace{bx}_{\geq 0 \text{ by assumption}}) \quad (39) \quad \text{Missing}$$

⟨I1:

acute:    $\acute{b}$     $\acute{a}$

⟨I2:

grave:    $\grave{b}$     $\grave{a}$

⟨I3:

ddot:    $\ddot{b}$     $\ddot{a}$

⟨I4:

tilde:    $\tilde{b}$     $\tilde{a}$

⟨I5:

bar:    $\bar{b}$     $\bar{a}$

⟨I6:

breve:    $\breve{b}$     $\breve{a}$

⟨I7:

hat:    $\hat{n}$     $\hat{a}$

⟨I8:

check:    $\check{b}$     $\check{a}$

⟨I9:

vec:  $\vec{b}$   $\vec{b}$

⟨I10:

widetilde:  $\widetilde{b}$   $\widetilde{a+b}$

⟨I11:

widehat:  $\widehat{b}$   $\widehat{a+b}$

⟨I12:

different flushbottom figure difficult fflash

⟨I13:

$C + \cdots + L$  example for cdots and lots  $C + \dots + L$

⟨I16⟩ - calligraphic characters

$\mathcal{A} \mathcal{B} \mathcal{C} \mathcal{D} \mathcal{E} \mathcal{F} \mathcal{G} \mathcal{H} \mathcal{I} \mathcal{J} \mathcal{K} \mathcal{L} \mathcal{M}$

$\mathcal{N} \mathcal{O} \mathcal{P} \mathcal{Q} \mathcal{R} \mathcal{S} \mathcal{T} \mathcal{U} \mathcal{V} \mathcal{W} \mathcal{X} \mathcal{Y} \mathcal{Z}$

⟨I17⟩ - bold calligraphic charactes

$\mathbf{\mathcal{A} \mathcal{B} \mathcal{C} \mathcal{D} \mathcal{E} \mathcal{F} \mathcal{G} \mathcal{H} \mathcal{I} \mathcal{J} \mathcal{K} \mathcal{L} \mathcal{M}}$

$\mathbf{\mathcal{N} \mathcal{O} \mathcal{P} \mathcal{Q} \mathcal{R} \mathcal{S} \mathcal{T} \mathcal{U} \mathcal{V} \mathcal{W} \mathcal{X} \mathcal{Y} \mathcal{Z}}$

⟨I18:

$\mathfrak{A} \mathfrak{B} \mathfrak{C} \mathfrak{D} \mathfrak{E} \mathfrak{F} \mathfrak{G} \mathfrak{H} \mathfrak{I} \mathfrak{J} \mathfrak{K} \mathfrak{L} \mathfrak{M}$

$\mathfrak{N} \mathfrak{O} \mathfrak{P} \mathfrak{Q} \mathfrak{R} \mathfrak{S} \mathfrak{T} \mathfrak{U} \mathfrak{V} \mathfrak{W} \mathfrak{X} \mathfrak{Y} \mathfrak{Z}$

$\mathfrak{a} \mathfrak{b} \mathfrak{c} \mathfrak{d} \mathfrak{e} \mathfrak{f} \mathfrak{g} \mathfrak{h} \mathfrak{i} \mathfrak{j} \mathfrak{k} \mathfrak{l} \mathfrak{m}$

$\mathfrak{n} \mathfrak{o} \mathfrak{p} \mathfrak{q} \mathfrak{r} \mathfrak{s} \mathfrak{t} \mathfrak{u} \mathfrak{v} \mathfrak{w} \mathfrak{x} \mathfrak{y} \mathfrak{z}$

⟨I19:

$\mathfrak{A} \mathfrak{B} \mathfrak{C} \mathfrak{D} \mathfrak{E} \mathfrak{F} \mathfrak{G} \mathfrak{H} \mathfrak{I} \mathfrak{J} \mathfrak{K} \mathfrak{L} \mathfrak{M}$

$\mathfrak{N} \mathfrak{O} \mathfrak{P} \mathfrak{Q} \mathfrak{R} \mathfrak{S} \mathfrak{T} \mathfrak{U} \mathfrak{V} \mathfrak{W} \mathfrak{X} \mathfrak{Y} \mathfrak{Z}$

$\mathfrak{a} \mathfrak{b} \mathfrak{c} \mathfrak{d} \mathfrak{e} \mathfrak{f} \mathfrak{g} \mathfrak{h} \mathfrak{i} \mathfrak{j} \mathfrak{k} \mathfrak{l} \mathfrak{m}$

⟨I20:

n o p q r s t u v w x y z

A B C D E F G H I J K L M

N O P Q R S T U V W X Y Z

⟨I21:

A B C D E F G H I J K L M

N O P Q R S T U V W X Y Z

⟨I27:

$$\frac{\pi}{2} \left[ \frac{1}{\Delta v} \sum_{i=1}^{N_e \Delta v} d\mathbf{p}_i \right]$$

⟨I28:

$$10^{\circ}\text{C} \quad 10_{\circ}\text{C} \quad f \circ g$$

⟨I29:

$\sin x$      $\arcsin x$      $\sinh x$      $\cos x$      $\arccos x$      $\cosh x$      $\tan x$

$\arctan x$      $\tanh x$      $\cot x$      $\coth x$      $\sec x$      $\csc x$

⟨I30:

$$f(x) \quad f'(x) \quad f(1)$$

Example 48:

$$\xleftarrow{\frac{x^2+2xy+y^2}{a+c}} \quad \xrightarrow{\frac{x^2+2xy+y^2}{a+c}} \quad \xleftarrow[\text{\scriptsize $x+y^2$}]{\text{\scriptsize maps to}} \quad \xrightarrow[\text{\scriptsize $x+y^2$}]{\text{\scriptsize maps to}} \quad \xleftarrow[\text{\scriptsize $a+c$}]{\text{\scriptsize maps to}}$$

$$\frac{1}{2} \quad \frac{1}{2} \quad \binom{1}{2} \quad \binom{1}{2} \quad \sqrt{p(1-p)/n}$$

⟨I22:

A B C D E F G H I J K L M

N O P Q R S T U V W X Y Z

a b c d e f g h i j k l m

n o p q r s t u v w x y z

⟨I23⟩ Italic sanserif alphabet

A B C D E F G H I J K L M

N O P Q R S T U V W X Y Z

a b c d e f g h i j k l m

n o p q r s t u v w x y z

⟨I24⟩ bold sanserif alphabet

A B C D E F G H I J K L M

N O P Q R S T U V W X Y Z

a b c d e f g h i j k l m

n o p q r s t u v w x y z

⟨I25⟩ bold-italic sanserif alphabet

A B C D E F G H I J K L M

N O P Q R S T U V W X Y Z

a b c d e f g h i j k l m

n o p q r s t u v w x y z

⟨I26⟩ - Typewriter font

A B C D E F G H I J K L M

N O P Q R S T U V W X Y Z

a b c d e f g h i j k l m n

o p q r s t u v w x y z