

Basic mathematical symbols and structures

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1 Standard mathematical symbols

We will use the robust single dollar environment for these

Math versions of text symbols: $\$_{\ddagger}\{\P\dots\}\S\ddagger\mathcal{L}\textcircled{\mathcal{C}}$

Keyboard symbols: $+ - = < > / : ! ' [] ()$

But for longer tests we will use the equation environment so that we don't overrun the line if we increase the font size. We'll do a basic macro test in section 2.2.

Greek:

$$\alpha\beta\gamma\delta\epsilon\zeta\eta\theta\iota\kappa\lambda\mu\nu\xi\omicron\pi\rho\sigma\tau\upsilon\phi\chi\psi\omega \quad (1)$$

Upper case Greek:

$$\Gamma\Delta\Theta\Lambda\Xi\P\Sigma\Upsilon\Phi\Psi\Omega \quad (2)$$

Normal, lower case:

$$a b c d e f g h i j k l m n o p q r s t u v w x y z \quad (3)$$

Normal, upper case:

$$A B C D E F G H I J K L M N O P Q R S T U V W X Y Z \quad (4)$$

Bold using boldmath, lower case:

$$\boldsymbol{a b c d e f g h i j k l m n o p q r s t u v w x y z} \quad (5)$$

Bold using boldmath, upper case:

$$\boldsymbol{A B C D E F G H I J K L M N O P Q R S T U V W X Y Z} \quad (6)$$

Italic, lower case:

$$i t a l i c a b c d e f g h i j k l m n o p q r s t u v w x y z \quad (7)$$

Italic, upper case:

$$i t a l i c A B C D E F G H I J K L M N O P Q R S T U V W X Y Z \quad (8)$$

2 Standard mathematical structures

Three different ways to inline $A_{i,j,k}^{2^n}$ $A_{i,j,k}^{2^n}$ $A_{i,j,k}^{2^n}$

Four different ways to displaymath.

$$\sum_{i=1}^{15} x_i^2 = x_1^2 + x_2^2 + x_3^2 + x_4^2 + x_5^2 + x_6^2 + x_7^2 + x_8^2 + x_9^2 + x_{10}^2 + x_{11}^2 + x_{12}^2 + x_{13}^2 + x_{14}^2 + x_{15}^2 \quad (100)$$

$$x_1^2 = x_2^2 = x_3^2 = x_4^2 = x_5^2 = x_6^2 = x_7^2 = x_8^2 = x_9^2 = x_{10}^2 = x_{11}^2 = x_{12}^2 = x_{13}^2 = x_{14}^2 = x_{15}^2$$

$$\prod_{i=1}^{15} x_i^2 = x_1^2 \ x_2^2 \ x_3^2 \ x_4^2 \ x_5^2 \ x_6^2 \ x_7^2 \ x_8^2 \ x_9^2 \ x_{10}^2 \ x_{11}^2 \ x_{12}^2 \ x_{13}^2 \ x_{14}^2 \ x_{15}^2$$

$$\prod_{i=1}^{15} x_i^2 = x_1^2 \cdot x_2^2 \cdot x_3^2 \cdot x_4^2 \cdot x_5^2 \cdot x_6^2 \cdot x_7^2 \cdot x_8^2 \cdot x_9^2 \cdot x_{10}^2 \cdot x_{11}^2 \cdot x_{12}^2 \cdot x_{13}^2 \cdot x_{14}^2 \cdot x_{15}^2$$

One of the forms is numbered equation 100.

$$\sqrt{\sum_{i=1}^{13} x_i^2} = \sqrt{x_1^2 + x_2^2 + x_3^2 + x_4^2 + x_5^2 + x_6^2 + x_7^2 + x_8^2 + x_9^2 + x_{10}^2 + x_{11}^2 + x_{12}^2 + x_{13}^2}$$

$$\sqrt{\sum_{i=1}^{13} x_i^2} = \left(x_1^2 + x_2^2 + x_3^2 + x_4^2 + x_5^2 + x_6^2 + x_7^2 + x_8^2 + x_9^2 + x_{10}^2 + x_{11}^2 + x_{12}^2 + x_{13}^2 \right)^{\frac{1}{2}}$$

Now for an equation array:

$$\begin{aligned} \sum_{i=1}^{13} 2^i &= 2^1 + 2^2 + 2^3 + 2^4 + 2^5 + 2^6 + 2^7 + 2^8 + 2^9 + 2^{10} + 2^{11} + 2^{12} + 2^{13} \\ &= 2 + 4 + 8 + 16 + 32 + 64 + 128 + 256 + 512 + 1024 + 2048 + 4096 + 8192 \\ &= 16382 \end{aligned} \quad (101)$$

$$\sum_{i=1}^{13} 2^i = 2^1 + 2^2 + 2^3 + 2^4 + 2^5 + 2^6 + 2^7 + 2^8 + 2^9 + 2^{10} + 2^{11} + 2^{12} + 2^{13}$$

$$= 2 + 4 + 8 + 16 + 32 + 64 + 128 + 256 + 512 + 1024 + 2048 + 4096 + 8192$$

$$= 16382 \quad \text{here is some text in the formula to fill up the line at 12pt font}$$

$$\left[\begin{array}{cc} a_{11} & a_{12} \\ a_{21} & a_{22} \end{array} \right]$$

$$\left[\begin{array}{cccccccccc} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{array} \right]$$

$$\left| \begin{array}{cc} 1 & 2 \\ 3 & 4 \end{array} \right| = (1 \times 4) - (2 \times 3)$$

$$= 4 - 6 = -2$$

$$\sqrt{a + \sqrt{\frac{b + c + d}{e}} + f}$$

$$\overline{\underline{a} + \overline{b} + \underline{c} + \overline{d} + \overline{\overline{e}}}$$

$$\overbrace{a + \overbrace{b + c + d}^{=0}}^{\text{text}}$$

$$\xrightarrow{a}$$

$$\begin{pmatrix} a \\ b \end{pmatrix}$$

$$a + \frac{1}{b + \frac{1}{c + \frac{1}{d + \frac{1}{e + \frac{1}{f + \frac{1}{g + \frac{1}{h}}}}}}}$$

$$a + \frac{1}{b + \frac{1}{c + \frac{1}{d + \frac{1}{e + \frac{1}{f + \frac{1}{g + \frac{1}{h}}}}}}}$$

2.1 Testing line breaking

$$a = b = c = d = e = f = g = h = i = j = k = l = m = n = o = p = q = r = s = t$$

$$a < b < c < d < e < f < g < h < i < j < k < l < m < n < o < p < q < r < s < t$$

$$a > b > c > d > e > f > g > h > i > j > k > l > m > n > o > p > q > r > s > t$$

$$a \leq b \leq c \leq d \leq e \leq f \leq g \leq h \leq i \leq j \leq k \leq l \leq m \leq n \leq o \leq p \leq q \leq r \leq s \leq t$$

$$a \geq b \geq c \geq d \geq e \geq f \geq g \geq h \geq i \geq j \geq k \geq l \geq m \geq n \geq o \geq p \geq q \geq r \geq s \geq t$$

$$a + b + c + d + e + f + g + h + i + j + k + l + m + n + o + p + q + r + s + t + u$$

$$a - b - c - d - e - f - g - h - i - j - k - l - m - n - o - p - q - r - s - t - u$$

$$a \times b \times c \times d \times e \times f \times g \times h \times i \times j \times k \times l \times m \times n \times o \times p \times q \times r \times s \times t \times u$$

$$a * b * c * d * e * f * g * h * i * j * k * l * m * n * o * p * q * r * s * t * u * v * w * x * y$$

$$a \cdot b \cdot c \cdot d \cdot e \cdot f \cdot g \cdot h \cdot i \cdot j \cdot k \cdot l \cdot m \cdot n \cdot o \cdot p \cdot q \cdot r \cdot s \cdot t \cdot u \cdot v \cdot w \cdot x \cdot y \cdot z \cdot a \cdot b \cdot c$$

$$a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z, a, b, c, d, e, f, g, h, i, j, k, l$$

2.2 Testing new commands

$$x_1 x^2 x_2$$