

Tip: Print out these pages for later (and quick) reference!

**How to use L<sup>A</sup>T<sub>E</sub>X on this site** To write math equations / symbols just enclose them between dollar signs or `\[, \]` tags, as shown below

`$ ..... $` or as `$$ ..... $$` or as `\[ ..... \]`

For example `$$a_1+a^2=\sqrt{a+b}+\frac{x}{y}$$` will yield a centered equation

$$a_1 + a^2 = \sqrt{a+b} + \frac{x}{y}$$

If you want an inline equation, use just one dollar sign, so `$a_1+a_2+\frac{1}{2}$` will look like this:  $a_1 + a_2 + \frac{1}{2}$ , and notice that the fraction has been diminished to the line's height. If you want the fraction (and other large things) to look nice, you can use the `\displaystyle` command, like this `$$\displaystyle a_1+a_2+\frac{1}{2}$$` which gives  $a_1 + a_2 + \frac{1}{2}$ .

If you want to see how a math formula was written by another fellow user, just click on the formula itself or just hold the mouse over the formula, you will see the latex code

**You can use classical L<sup>A</sup>T<sub>E</sub>X tags like `$`, `$$`, `\[`, `\]`**, and I wish that you use them as much as possible. Try to avoid as much as possible `\begin{...}\end{...}`, and all other such environments.

For security reasons, all mathematical symbols, but only a small subset of L<sup>A</sup>T<sub>E</sub>X-commands will work on the forum.

Let's continue with a quick L<sup>A</sup>T<sub>E</sub>X course.

**Special characters.** The following symbols have special meaning in L<sup>A</sup>T<sub>E</sub>X: `# $ % _ { } ~ ^ \`. You can print the first seven of these by using `\# \$ \% \_ \{ \}`.

**Lines and Text.** `\\` starts a new line, `\` includes a space, `\mbox{...}` includes text.

**subSCRIPTS and SUPERscripts.** `x^2` yields  $x^2$ , `x_{2n}` yields  $x_{2n}$ . Here is another example: `\log_{5} 25=2` produces  $\log_5 25 = 2$ .

Be advised of the following `\{...\}` are used to simbolize one item. But if you are only referring to one item, you can skip the brackets. For example: `\x_{123}` yields  $x_{123}$ , as `x_{123}` yields  $x_{123}$ . Also can be used with fractions (see below).

**Fractions.** Use `\frac` to display fractions. Example: `\frac{\pi^2}{6}` produces  $\frac{\pi^2}{6}$ .

Again without the brackets `\frac 12` yields  $\frac{1}{2}$ , `\frac 123` yields  $\frac{1}{2}3$  and `\frac 1{23}` yields  $\frac{1}{23}$ .

**Roots.** Use `\sqrt`. For instance, `\sqrt{a^2+b^2}` yields  $\sqrt{a^2+b^2}$ . You can also get roots of higher order: `\sqrt[n]{2x+1}` yields  $\sqrt[n]{2x+1}$ .

**Delimiters (also known as brackets).** The inputs `( ) [ ] \{ \}` yield the outputs  $() [] \{ \}$ .

**Greek letters.**

|             |                        |          |                     |            |                       |               |                          |
|-------------|------------------------|----------|---------------------|------------|-----------------------|---------------|--------------------------|
| $\alpha$    | <code>\alpha</code>    | $\beta$  | <code>\beta</code>  | $\gamma$   | <code>\gamma</code>   | $\delta$      | <code>\delta</code>      |
| $\epsilon$  | <code>\epsilon</code>  | $\zeta$  | <code>\zeta</code>  | $\eta$     | <code>\eta</code>     | $\theta$      | <code>\theta</code>      |
| $\iota$     | <code>\iota</code>     | $\kappa$ | <code>\kappa</code> | $\lambda$  | <code>\lambda</code>  | $\mu$         | <code>\mu</code>         |
| $\nu$       | <code>\nu</code>       | $\xi$    | <code>\xi</code>    | $\pi$      | <code>\pi</code>      | $\rho$        | <code>\rho</code>        |
| $\sigma$    | <code>\sigma</code>    | $\tau$   | <code>\tau</code>   | $\upsilon$ | <code>\upsilon</code> | $\phi$        | <code>\phi</code>        |
| $\chi$      | <code>\chi</code>      | $\psi$   | <code>\psi</code>   | $\omega$   | <code>\omega</code>   | $\varepsilon$ | <code>\varepsilon</code> |
| $\vartheta$ | <code>\vartheta</code> | $\varpi$ | <code>\varpi</code> | $\varrho$  | <code>\varrho</code>  | $\varsigma$   | <code>\varsigma</code>   |
| $\varphi$   | <code>\varphi</code>   | $\Gamma$ | <code>\Gamma</code> | $\Delta$   | <code>\Delta</code>   | $\Theta$      | <code>\Theta</code>      |
| $\Lambda$   | <code>\Lambda</code>   | $\Xi$    | <code>\Xi</code>    | $\Pi$      | <code>\Pi</code>      | $\Sigma$      | <code>\Sigma</code>      |
| $\Upsilon$  | <code>\Upsilon</code>  | $\Phi$   | <code>\Phi</code>   | $\Psi$     | <code>\Psi</code>     | $\Omega$      | <code>\Omega</code>      |

**Functions.**

|           |                      |           |                      |           |                      |           |                      |
|-----------|----------------------|-----------|----------------------|-----------|----------------------|-----------|----------------------|
| $\log$    | <code>\log</code>    | $\lg$     | <code>\lg</code>     | $\ln$     | <code>\ln</code>     | $\exp$    | <code>\exp</code>    |
| $\sin$    | <code>\sin</code>    | $\cos$    | <code>\cos</code>    | $\tan$    | <code>\tan</code>    | $\cot$    | <code>\cot</code>    |
| $\sec$    | <code>\sec</code>    | $\csc$    | <code>\csc</code>    | $\arcsin$ | <code>\arcsin</code> | $\arccos$ | <code>\arccos</code> |
| $\arctan$ | <code>\arctan</code> | $\deg$    | <code>\deg</code>    | $\arg$    | <code>\arg</code>    | $\inf$    | <code>\inf</code>    |
| $\sup$    | <code>\sup</code>    | $\min$    | <code>\min</code>    | $\max$    | <code>\max</code>    | $\lim$    | <code>\lim</code>    |
| $\liminf$ | <code>\liminf</code> | $\limsup$ | <code>\limsup</code> | $\det$    | <code>\det</code>    | $\dim$    | <code>\dim</code>    |
| $\ker$    | <code>\ker</code>    | $\gcd$    | <code>\gcd</code>    | $\mod$    | <code>\bmod</code>   |           |                      |

**Miscellaneous Symbols.**

|            |                       |              |                         |                |                           |
|------------|-----------------------|--------------|-------------------------|----------------|---------------------------|
| $\aleph$   | <code>\aleph</code>   | $\prime$     | <code>\prime</code>     | $\forall$      | <code>\forall</code>      |
| $\hbar$    | <code>\hbar</code>    | $\emptyset$  | <code>\emptyset</code>  | $\exists$      | <code>\exists</code>      |
| $\imath$   | <code>\imath</code>   | $\nabla$     | <code>\nabla</code>     | $\neg$         | <code>\neg</code>         |
| $\jmath$   | <code>\jmath</code>   | $\surd$      | <code>\surd</code>      | $\flat$        | <code>\flat</code>        |
| $\ell$     | <code>\ell</code>     | $\top$       | <code>\top</code>       | $\natural$     | <code>\natural</code>     |
| $\wp$      | <code>\wp</code>      | $\perp$      | <code>\perp</code>      | $\sharp$       | <code>\sharp</code>       |
| $\Re$      | <code>\Re</code>      | $\parallel$  | <code>\parallel</code>  | $\clubsuit$    | <code>\clubsuit</code>    |
| $\Im$      | <code>\Im</code>      | $\angle$     | <code>\angle</code>     | $\diamondsuit$ | <code>\diamondsuit</code> |
| $\partial$ | <code>\partial</code> | $\triangle$  | <code>\triangle</code>  | $\heartsuit$   | <code>\heartsuit</code>   |
| $\infty$   | <code>\infty</code>   | $\backslash$ | <code>\backslash</code> | $\spadesuit$   | <code>\spadesuit</code>   |

**“Large” Operators.**

|           |                      |             |                        |              |                         |
|-----------|----------------------|-------------|------------------------|--------------|-------------------------|
| $\sum$    | <code>\sum</code>    | $\bigcap$   | <code>\bigcap</code>   | $\bigodot$   | <code>\bigodot</code>   |
| $\prod$   | <code>\prod</code>   | $\bigcup$   | <code>\bigcup</code>   | $\bigotimes$ | <code>\bigotimes</code> |
| $\coprod$ | <code>\coprod</code> | $\bigsqcup$ | <code>\bigsqcup</code> | $\bigoplus$  | <code>\bigoplus</code>  |
| $\int$    | <code>\int</code>    | $\bigvee$   | <code>\bigvee</code>   | $\biguplus$  | <code>\biguplus</code>  |
| $\oint$   | <code>\oint</code>   | $\bigwedge$ | <code>\bigwedge</code> |              |                         |

## Binary Operations.

|             |                        |                  |                             |            |                       |
|-------------|------------------------|------------------|-----------------------------|------------|-----------------------|
| $\pm$       | <code>\pm</code>       | $\cap$           | <code>\cap</code>           | $\vee$     | <code>\vee</code>     |
| $\mp$       | <code>\mp</code>       | $\cup$           | <code>\cup</code>           | $\wedge$   | <code>\wedge</code>   |
| $\setminus$ | <code>\setminus</code> | $\oplus$         | <code>\oplus</code>         | $\oplus$   | <code>\oplus</code>   |
| $\cdot$     | <code>\cdot</code>     | $\sqcap$         | <code>\sqcap</code>         | $\ominus$  | <code>\ominus</code>  |
| $\times$    | <code>\times</code>    | $\sqcup$         | <code>\sqcup</code>         | $\otimes$  | <code>\otimes</code>  |
| $*$         | <code>\ast</code>      | $\triangleleft$  | <code>\triangleleft</code>  | $\oslash$  | <code>\oslash</code>  |
| $\star$     | <code>\star</code>     | $\triangleright$ | <code>\triangleright</code> | $\odot$    | <code>\odot</code>    |
| $\diamond$  | <code>\diamond</code>  | $\wr$            | <code>\wr</code>            | $\dagger$  | <code>\dagger</code>  |
| $\circ$     | <code>\circ</code>     | $\bigcirc$       | <code>\bigcirc</code>       | $\ddagger$ | <code>\ddagger</code> |
| $\bullet$   | <code>\bullet</code>   | $\triangleup$    | <code>\triangleup</code>    | $\amalg$   | <code>\amalg</code>   |
| $\div$      | <code>\div</code>      | $\nabla$         | <code>\nabla</code>         |            |                       |

## Relations.

|             |                        |               |                          |           |                      |
|-------------|------------------------|---------------|--------------------------|-----------|----------------------|
| $\leq$      | <code>\leq</code>      | $\geq$        | <code>\geq</code>        | $\equiv$  | <code>\equiv</code>  |
| $\prec$     | <code>\prec</code>     | $\succ$       | <code>\succ</code>       | $\sim$    | <code>\sim</code>    |
| $\preceq$   | <code>\preceq</code>   | $\succeq$     | <code>\succeq</code>     | $\simeq$  | <code>\simeq</code>  |
| $\ll$       | <code>\ll</code>       | $\gg$         | <code>\gg</code>         | $\asymp$  | <code>\asymp</code>  |
| $\subset$   | <code>\subset</code>   | $\supset$     | <code>\supset</code>     | $\approx$ | <code>\approx</code> |
| $\subseteq$ | <code>\subseteq</code> | $\supseteq$   | <code>\supseteq</code>   | $\cong$   | <code>\cong</code>   |
| $\sqsubset$ | <code>\sqsubset</code> | $\sqsupseteq$ | <code>\sqsupseteq</code> | $\bowtie$ | <code>\bowtie</code> |
| $\in$       | <code>\in</code>       | $\ni$         | <code>\ni</code>         | $\propto$ | <code>\propto</code> |
| $\vdash$    | <code>\vdash</code>    | $\dashv$      | <code>\dashv</code>      | $\models$ | <code>\models</code> |
| $($         | <code>\left(</code>    | $ $           | <code>\mid</code>        | $\dot{=}$ | <code>\doteq</code>  |
| $)$         | <code>\right(</code>   | $\parallel$   | <code>\parallel</code>   | $\perp$   | <code>\perp</code>   |

## Arrows.

|                       |                                  |                       |                                  |
|-----------------------|----------------------------------|-----------------------|----------------------------------|
| $\leftarrow$          | <code>\leftarrow</code>          | $\rightarrow$         | <code>\rightarrow</code>         |
| $\longleftarrow$      | <code>\longleftarrow</code>      | $\longrightarrow$     | <code>\longrightarrow</code>     |
| $\Leftrightarrow$     | <code>\Leftrightarrow</code>     | $\Rightarrow$         | <code>\Rightarrow</code>         |
| $\Longleftarrow$      | <code>\Longleftarrow</code>      | $\Longrightarrow$     | <code>\Longrightarrow</code>     |
| $\leftrightarrow$     | <code>\leftrightarrow</code>     | $\Leftrightarrow$     | <code>\Leftrightarrow</code>     |
| $\longleftrightarrow$ | <code>\longleftrightarrow</code> | $\Longleftrightarrow$ | <code>\Longleftrightarrow</code> |
| $\hookrightarrow$     | <code>\hookrightarrow</code>     | $\hookrightarrow$     | <code>\hookrightarrow</code>     |
| $\leftharpoonup$      | <code>\leftharpoonup</code>      | $\rightharpoonup$     | <code>\rightharpoonup</code>     |
| $\leftharpoondown$    | <code>\leftharpoondown</code>    | $\rightharpoondown$   | <code>\rightharpoondown</code>   |
| $\uparrow$            | <code>\uparrow</code>            | $\downarrow$          | <code>\downarrow</code>          |
| $\Uparrow$            | <code>\Uparrow</code>            | $\Downarrow$          | <code>\Downarrow</code>          |
| $\updownarrow$        | <code>\updownarrow</code>        | $\Updownarrow$        | <code>\Updownarrow</code>        |
| $\nearrow$            | <code>\nearrow</code>            | $\nwarrow$            | <code>\nwarrow</code>            |
| $\searrow$            | <code>\searrow</code>            | $\swarrow$            | <code>\swarrow</code>            |
| $\mapsto$             | <code>\mapsto</code>             | $\longmapsto$         | <code>\longmapsto</code>         |
| $\rightleftharpoons$  | <code>\rightleftharpoons</code>  |                       |                                  |

**Matrices, arrays, etc.** `\begin{array}{cc}-1&5\\ \sqrt{2} & 3\end{array}` yields  $\begin{array}{cc}-1&5\\ \sqrt{2} & 3\end{array}$ . You can produce big delimiters by prefacing with `\left` and closing with `\right`. Example:

`\left(\begin{array}{cc}-1&5\\ \sqrt{2} & 3\end{array}\right)` yields  $\left(\begin{array}{cc}-1&5\\ \sqrt{2} & 3\end{array}\right)$ .

`\right.` matches a `\left...` and is necessary to “close” the `\left` tag, but does not produce any output. Example:

`f(x)=\left\{\begin{array}{cc}1,&\mbox{ if } \\ x\geq 2&-1, & \mbox{ if } x<2\end{array}\right\}`.

yields  $f(x) = \begin{cases} 1, & \text{if } x \geq 2 \\ -1, & \text{if } x < 2 \end{cases}$

`{cc}` after the `\begin{array}` command means that the array has two centered columns. Other alignment options are `r` and `l`. Use `|` to insert a vertical line. `\hline` inserts a horizontal line. Example:

`\begin{array}{l|cr}3&4&0\\-3&-2&1\\\hline\end{array}`

yields  $\begin{array}{c|cc} 3 & 4 & 0 \\ -3 & -2 & 1 \\ \hline \end{array}$

**OVERlining- and underLINING.** `\underline{\overline{x^2}+1}` yields  $\overline{x^2+1}$ ,

`\underbrace{\overbrace{x^2}+1}` yields  $\underbrace{\overbrace{x^2}+1}$ . There are also `\hat`, `\tilde` and `\widehat`

and `\widetilde`. Example:  $\tilde{x}, \sqrt{x^2-1}$ . Other accents: `\check`, `\bar`, `\vec`, `\dot`, `\ddot`:  $\check{a}, \bar{a}, \vec{a}, \dot{x}, \ddot{x}$ .

With regards,

AoPS - MathLinks Team.

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