

Art of Problem Solving
LaTeX:Symbols

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LaTeX

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This article will provide a short list of commonly used LaTeX symbols.

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Operators

| Symbol | Command | Symbol | Command | Symbol | Command |
|--------------------|-------------------------------|------------|-----------------------|------------------|-----------------------------|
| \pm | <code>\pm</code> | \mp | <code>\mp</code> | \times | <code>\times</code> |
| \div | <code>\div</code> | \cdot | <code>\cdot</code> | \ast | <code>\ast</code> |
| \star | <code>\star</code> | \dagger | <code>\dagger</code> | \ddagger | <code>\ddagger</code> |
| \amalg | <code>\amalg</code> | \cap | <code>\cap</code> | \cup | <code>\cup</code> |
| \uplus | <code>\uplus</code> | \sqcap | <code>\sqcap</code> | \sqcup | <code>\sqcup</code> |
| \vee | <code>\vee</code> | \wedge | <code>\wedge</code> | \oplus | <code>\oplus</code> |
| \ominus | <code>\ominus</code> | \otimes | <code>\otimes</code> | \circ | <code>\circ</code> |
| \bullet | <code>\bullet</code> | \diamond | <code>\diamond</code> | \triangleleft | <code>\triangleleft</code> |
| \rhd | <code>\rhd</code> | \unlhd | <code>\unlhd</code> | \unrhd | <code>\unrhd</code> |
| \oslash | <code>\oslash</code> | \odot | <code>\odot</code> | \bigcirc | <code>\bigcirc</code> |
| \triangleleft | <code>\triangleleft</code> | \Diamond | <code>\Diamond</code> | \bigtriangleup | <code>\bigtriangleup</code> |
| \bigtriangledown | <code>\bigtriangledown</code> | \Box | <code>\Box</code> | \triangleright | <code>\triangleright</code> |
| \setminus | <code>\setminus</code> | \wr | <code>\wr</code> | \sqrt{x} | <code>\sqrt{x}</code> |
| x° | <code>x^{\circ}</code> | | | | |

Relations

| Symbol | Command | Symbol | Command | Symbol | Command |
|---------------|--------------------------|-------------|------------------------|---------------|--------------------------|
| \leq | <code>\leq</code> | \geq | <code>\geq</code> | \neq | <code>\neq</code> |
| \sim | <code>\sim</code> | \parallel | <code>\parallel</code> | \gg | <code>\gg</code> |
| \doteq | <code>\doteq</code> | \simeq | <code>\simeq</code> | \subset | <code>\subset</code> |
| \supset | <code>\supset</code> | \approx | <code>\approx</code> | \asymp | <code>\asymp</code> |
| \subseteq | <code>\subseteq</code> | \supseteq | <code>\supseteq</code> | \cong | <code>\cong</code> |
| \smile | <code>\smile</code> | \sqsubset | <code>\sqsubset</code> | \sqsupset | <code>\sqsupset</code> |
| \equiv | <code>\equiv</code> | \frown | <code>\frown</code> | \sqsubseteq | <code>\sqsubseteq</code> |
| \sqsupseteq | <code>\sqsupseteq</code> | \propto | <code>\propto</code> | \bowtie | <code>\bowtie</code> |
| \in | <code>\in</code> | \ni | <code>\ni</code> | \prec | <code>\prec</code> |
| \succ | <code>\succ</code> | \vdash | <code>\vdash</code> | \dashv | <code>\dashv</code> |
| \preceq | <code>\preceq</code> | \succeq | <code>\succeq</code> | \models | <code>\models</code> |
| \perp | <code>\perp</code> | \parallel | <code>\parallel</code> | \lvert | <code>\lvert</code> |
| \mid | <code>\mid</code> | | | | |

Negations of many of these relations can be formed by just putting `\not` before the symbol, or by slipping an `n` between the `\` and the word. Here are a few examples, plus a few other negations; it works for many of the others as well.

| Symbol | Command | Symbol | Command | Symbol | Command |
|-----------------|----------------------------|-------------|------------------------|--------------|-------------------------|
| \nmid | <code>\nmid</code> | \nleq | <code>\nleq</code> | \ngeq | <code>\ngeq</code> |
| \nsim | <code>\nsim</code> | \ncong | <code>\ncong</code> | \nparallel | <code>\nparallel</code> |
| $\not<$ | <code>\not<</code> | $\not>$ | <code>\not></code> | $\not=$ | <code>\not=</code> |
| $\not\leq$ | <code>\not\leq</code> | $\not\geq$ | <code>\not\geq</code> | $\not\sim$ | <code>\not\sim</code> |
| $\not\approx$ | <code>\not\approx</code> | $\not\cong$ | <code>\not\cong</code> | $\not\equiv$ | <code>\not\equiv</code> |
| $\not\parallel$ | <code>\not\parallel</code> | \nless | <code>\nless</code> | \ngtr | <code>\ngtr</code> |
| \lneq | <code>\lneq</code> | \gneq | <code>\gneq</code> | \lnsim | <code>\lnsim</code> |
| \lneqq | <code>\lneqq</code> | \gneqq | <code>\gneqq</code> | | |

To use other relations not listed here, such as $=$, $>$, and $<$, in LaTeX, you may just use the symbols on your keyboard.

Greek Letters

Lowercase Letters

| Symbol | Command | Symbol | Command | Symbol | Command | Symbol | Command |
|------------|-----------------------|---------------|--------------------------|----------|---------------------|------------|-----------------------|
| α | <code>\alpha</code> | β | <code>\beta</code> | γ | <code>\gamma</code> | δ | <code>\delta</code> |
| ϵ | <code>\epsilon</code> | ε | <code>\varepsilon</code> | ζ | <code>\zeta</code> | η | <code>\eta</code> |
| θ | <code>\theta</code> | ϑ | <code>\vartheta</code> | ι | <code>\iota</code> | κ | <code>\kappa</code> |
| λ | <code>\lambda</code> | μ | <code>\mu</code> | ν | <code>\nu</code> | ξ | <code>\xi</code> |
| π | <code>\pi</code> | ϖ | <code>\varpi</code> | ρ | <code>\rho</code> | ϱ | <code>\varrho</code> |
| σ | <code>\sigma</code> | ς | <code>\varsigma</code> | τ | <code>\tau</code> | υ | <code>\upsilon</code> |
| ϕ | <code>\phi</code> | φ | <code>\varphi</code> | χ | <code>\chi</code> | ψ | <code>\psi</code> |
| ω | <code>\omega</code> | | | | | | |

Capital Letters

| Symbol | Command | Symbol | Command | Symbol | Command | Symbol | Command |
|----------|---------------------|----------|---------------------|----------|---------------------|------------|-----------------------|
| Γ | <code>\Gamma</code> | Δ | <code>\Delta</code> | Θ | <code>\Theta</code> | Λ | <code>\Lambda</code> |
| Ξ | <code>\Xi</code> | Π | <code>\Pi</code> | Σ | <code>\Sigma</code> | Υ | <code>\Upsilon</code> |
| Φ | <code>\Phi</code> | Ψ | <code>\Psi</code> | Ω | <code>\Omega</code> | | |

Headline text

Arrows

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

(For those of you who hate typing long strings of letters, `\iff` and `\implies` can be used in place of `\Longleftarrow` and `\Longrightarrow` respectively.)

Dots

| Symbol | Command | Symbol | Command | Symbol | Command | Symbol | Command |
|---------|--------------------|----------|---------------------|----------|---------------------|--------|---------|
| \dots | <code>\dots</code> | \cdots | <code>\cdots</code> | \ddots | <code>\ddots</code> | | |

(The '2's after `\ldots` and `\cdots` are only present to make the distinction between the two clear.)

Accents

| Symbol | Command | Symbol | Command | Symbol | Command |
|-------------|------------------------|-------------|------------------------|----------------|---------------------------|
| \hat{x} | <code>\hat{x}</code> | \check{x} | <code>\check{x}</code> | \dot{x} | <code>\dot{x}</code> |
| \breve{x} | <code>\breve{x}</code> | \acute{x} | <code>\acute{x}</code> | \ddot{x} | <code>\ddot{x}</code> |
| \grave{x} | <code>\grave{x}</code> | \tilde{x} | <code>\tilde{x}</code> | \mathring{x} | <code>\mathring{x}</code> |
| \bar{x} | <code>\bar{x}</code> | \vec{x} | <code>\vec{x}</code> | | |

When applying accents to i and j , you can use `\imath` and `\jmath` to keep the dots from interfering with the accents:

| Symbol | Command | Symbol | Command |
|-----------|---------------------------|-------------|-----------------------------|
| \vec{j} | <code>\vec{\jmath}</code> | \tilde{i} | <code>\tilde{\imath}</code> |

`\tilde` and `\hat` have wide versions that allow you to accent an expression:

| Symbol | Command | Symbol | Command |
|-----------------|----------------------------|-------------------|------------------------------|
| $\widehat{3+x}$ | <code>\widehat{3+x}</code> | \widetilde{abc} | <code>\widetilde{abc}</code> |

Others

| Symbol | Command | Symbol | Command | Symbol | Command |
|----------|---------------------|-------------|------------------------|--------------|-------------------------|
| ∞ | <code>\infty</code> | \triangle | <code>\triangle</code> | \angle | <code>\angle</code> |
| \aleph | <code>\aleph</code> | \hbar | <code>\hbar</code> | \imath | <code>\imath</code> |
| \jmath | <code>\jmath</code> | ℓ | <code>\ell</code> | \wp | <code>\wp</code> |
| \Re | <code>\Re</code> | \Im | <code>\Im</code> | \mathbb{U} | <code>\mathbb{U}</code> |

| | | | | | |
|----------------------|-------------------------|----------------------------|-----------------------------|------------------|---------------------------|
| \prime | <code>\Re</code> | \emptyset | <code>\Im</code> | ∇ | <code>\mho</code> |
| $\sqrt{}$ | <code>\prime</code> | ∂ | <code>\emptyset</code> | \top | <code>\nabla</code> |
| \bot | <code>\surd</code> | \vdash | <code>\partial</code> | \dashv | <code>\top</code> |
| \forall | <code>\bot</code> | \exists | <code>\vdash</code> | \neg | <code>\dashv</code> |
| \flat | <code>\forall</code> | \natural | <code>\exists</code> | \sharp | <code>\neg</code> |
| \backslash | <code>\flat</code> | \Box | <code>\natural</code> | \Diamond | <code>\sharp</code> |
| \clubsuit | <code>\backslash</code> | \diamondsuit | <code>\Box</code> | \heartsuit | <code>\Diamond</code> |
| \spadesuit | <code>\clubsuit</code> | \Join | <code>\diamondsuit</code> | \blacksquare | <code>\heartsuit</code> |
| \S | <code>\spadesuit</code> | \P | <code>\Join</code> | \copyright | <code>\blacksquare</code> |
| \pounds | <code>\S</code> | \overarc{ABC} | <code>\P</code> | \underarc{XYZ} | <code>\copyright</code> |
| | <code>\pounds</code> | <code>\overarc{ABC}</code> | <code>\underarc{XYZ}</code> | | |

Command Symbols

Some symbols are used in commands so they need to be treated in a special way.

| | | | | | | | |
|--------|--------------------------|--------|---------------------|--------|-----------------|--------------|-------------------------|
| Symbol | Command | Symbol | Command | Symbol | Command | Symbol | Command |
| $\%$ | <code>\textdollar</code> | $\&$ | <code>\&</code> | $\%$ | <code>\%</code> | $\#$ | <code>\#</code> |
| $_$ | <code>_</code> | $\{$ | <code>\{</code> | $\}$ | <code>\}</code> | \backslash | <code>\backslash</code> |

(Warning: Using `\$` for $\$$ will result in 036. This is a bug as far as we know. Depending on the version of LaTeX this is not always a problem.)

European Language Symbols

| | | | | | | | |
|--------|--------------------|--------|--------------------|--------|--------------------|--------|-------------------|
| Symbol | Command | Symbol | Command | Symbol | Command | Symbol | Command |
| \o | <code>{\oe}</code> | \ae | <code>{\ae}</code> | \aa | <code>{\aa}</code> | \o | <code>{\o}</code> |
| \O | <code>{\OE}</code> | \AE | <code>{\AE}</code> | \AA | <code>{\AA}</code> | \O | <code>{\O}</code> |
| \l | <code>{\l}</code> | \B | <code>{\ss}</code> | \i | <code>{\i}</code> | | |
| \L | <code>{\L}</code> | \SS | <code>{\SS}</code> | \i | <code>{\i}</code> | | |

Bracketing Symbols

In mathematics, sometimes we need to enclose expressions in brackets or braces or parentheses. Some of these work just as you'd imagine in LaTeX; type `(` and `)` for parentheses, `[` and `]` for brackets, and `|` and `|` for absolute value. However, other symbols have special commands:

| | | | | | |
|--------------|-------------------------|-----------|----------------------|-----------|----------------------|
| Symbol | Command | Symbol | Command | Symbol | Command |
| $\{$ | <code>\{</code> | $\}$ | <code>\}</code> | $\ $ | <code>\ </code> |
| \backslash | <code>\backslash</code> | \lfloor | <code>\lfloor</code> | \rfloor | <code>\rfloor</code> |
| \lceil | <code>\lceil</code> | \rceil | <code>\rceil</code> | \langle | <code>\langle</code> |
| \rangle | <code>\rangle</code> | | | | |

You might notice that if you use any of these to typeset an expression that is vertically large, like

$$\left(\frac{a}{x}\right)^2$$

the parentheses don't come out the right size:

$$\left(\frac{a}{x}\right)^2$$

If we put `\left` and `\right` before the relevant parentheses, we get a prettier expression:

$$\left(\frac{a}{x}\right)^2$$

gives

$$\left(\frac{a}{x}\right)^2$$

`\left` and `\right` can also be used to resize the following symbols:

| | | | | | |
|------------|-----------------------|--------------|-------------------------|----------------|---------------------------|
| Symbol | Command | Symbol | Command | Symbol | Command |
| \uparrow | <code>\uparrow</code> | \downarrow | <code>\downarrow</code> | \updownarrow | <code>\updownarrow</code> |
| \Uparrow | <code>\Uparrow</code> | \Downarrow | <code>\Downarrow</code> | \Updownarrow | <code>\Updownarrow</code> |

Multi-Size Symbols

Some symbols render differently in inline math mode and in display mode. Display mode occurs when you use `\[...]` or `$$...$$`, or environments like `\begin{equation}... \end{equation}`, `\begin{align}... \end{align}`. Read more in the commands section of the guide about how symbols which take arguments above and below the symbols, such as a summation symbol, behave in the two modes.

In each of the following, the two images show the symbol in display mode, then in inline mode.

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

Examples

- ◆ x^y is the same as $x^{\{y\}}$, producing x^y .
- ◆ x_y is the same as $x_{\{y\}}$, producing x_y .
- ◆ However, x^{10} is *not* the same as $x^{\{10\}}$. The former produces x^10 instead of x^{10} .

See Also

- ◆ Next: Commands
- ◆ Previous: Layout

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