

MathJax basic tutorial and quick reference

1. To see how any formula was written in any question or answer, including this one, right-click on the expression it and choose "Show Math As > TeX Commands". (When you do this, the '\$' will not display. Make sure you add these. See the next point.)

2. For inline formulas, enclose the formula in `$. . . $`. For displayed formulas, use `$$. . . $$`.

These render differently. For example, type

`\sum_{i=0}^n i^2 = \frac{(n^2+n)(2n+1)}{6}`

to show $\sum_{i=0}^n i^2 = \frac{(n^2+n)(2n+1)}{6}$ (which is inline mode) or type

`$$\sum_{i=0}^n i^2 = \frac{(n^2+n)(2n+1)}{6}$$`

to show

$$\sum_{i=0}^n i^2 = \frac{(n^2 + n)(2n + 1)}{6}$$

(which is display mode).

3. For **Greek letters**, use `\alpha`, `\beta`, ..., `\omega`: $\alpha, \beta, \dots, \omega$. For uppercase, use `\Gamma`, `\Delta`, ..., `\Omega`.

4. For **superscripts and subscripts**, use `^` and `_`. For example, `x_{i^2}`: x_i^2 , `\log_2 x`: $\log_2 x$.

5. **Groups**. Superscripts, subscripts, and other operations apply only to the next "group". A "group" is either a single symbol, or any formula surrounded by curly braces `{ ... }`. If you do `10^10`, you will get a surprise: 10^10 . But `10^{10}` gives what you probably wanted: 10^{10} . Use curly braces to delimit a formula to which a superscript or subscript applies: `x^5^6` is an error; `{x^y}^z` is x^{y^z} , and `x^{y^z}` is x^{y^z} . Observe the difference between `x_{i^2}` x_i^2 and `x_{i^2}` x_{i^2} .

6. **Parentheses** Ordinary symbols `()[]` make parentheses and brackets $(2 + 3)[4 + 4]$. Use `\{` and `\}` for curly braces $\{ \}$.

These do *not* scale with the formula in between, so if you write $(\frac{\sqrt{x}}{y^3})$ the parentheses will be too small: $(\frac{\sqrt{x}}{y^3})$. Using

`\left(... \right)` will make the sizes adjust automatically to the formula they enclose: $\left(\frac{\sqrt{x}}{y^3}\right)$ is $\left(\frac{\sqrt{x}}{y^3}\right)$.

`\left` and `\right` apply to all the following sorts of parentheses: `(` and `)` (x) , `[` and `]` $[x]$, `\{` and `\}` $\{x\}$, `|` $|x|$, `\vert` $|x|$, `\Vert` $\|x\|$, `\langle` and `\rangle` $\langle x \rangle$, `\lceil` and `\rceil` $\lceil x \rceil$, and `\lfloor` and `\rfloor` $\lfloor x \rfloor$. There are also invisible parentheses, denoted by `\left.\right\}`. `\left.\right\}` is $\frac{1}{2}$.

7. **Sums and integrals** `\sum` and `\int`; the subscript is the lower limit and the superscript is the upper limit, so for example `\sum_{i=1}^n`. Don't forget `{ ... }` if the limits are more than a single symbol. For example, `\sum_{i=0}^{\infty} i^2` is $\sum_{i=0}^{\infty} i^2$. Similarly, `\prod`, `\int`, `\bigcup`, `\bigcap`, `\iint`.

8. **Fractions** There are two ways to make these. `\frac{a}{b}` applies to the next two groups, and produces $\frac{a}{b}$; for more complicated numerators and denominators use `{ ... } : \frac{a+1}{b+1}` is $\frac{a+1}{b+1}$. If the numerator and denominator are complicated, you may prefer `\over`, which splits up the group that it is in: `{a+1\over b+1}` is $\frac{a+1}{b+1}$.

9. **Fonts**

- Use `\mathbb` or `\Bbb` for "blackboard bold": $\mathbb{C}\mathbb{N}\mathbb{Q}\mathbb{R}\mathbb{Z}$.
- Use `\mathbf` for boldface: $\mathbf{A}\mathbf{B}\mathbf{C}\mathbf{D}\mathbf{E}\mathbf{F}\mathbf{G}\mathbf{H}\mathbf{I}\mathbf{J}\mathbf{K}\mathbf{L}\mathbf{M}\mathbf{N}\mathbf{O}\mathbf{P}\mathbf{Q}\mathbf{R}\mathbf{S}\mathbf{T}\mathbf{U}\mathbf{V}\mathbf{W}\mathbf{X}\mathbf{Y}\mathbf{Z}$ $\mathbf{a}\mathbf{b}\mathbf{c}\mathbf{d}\mathbf{e}\mathbf{f}\mathbf{g}\mathbf{h}\mathbf{i}\mathbf{j}\mathbf{k}\mathbf{l}\mathbf{m}\mathbf{n}\mathbf{o}\mathbf{p}\mathbf{q}\mathbf{r}\mathbf{s}\mathbf{t}\mathbf{u}\mathbf{v}\mathbf{w}\mathbf{x}\mathbf{y}\mathbf{z}$.
- Use `\mathtt` for "typewriter" font: $\mathtt{A}\mathtt{B}\mathtt{C}\mathtt{D}\mathtt{E}\mathtt{F}\mathtt{G}\mathtt{H}\mathtt{I}\mathtt{J}\mathtt{K}\mathtt{L}\mathtt{M}\mathtt{N}\mathtt{O}\mathtt{P}\mathtt{Q}\mathtt{R}\mathtt{S}\mathtt{T}\mathtt{U}\mathtt{V}\mathtt{W}\mathtt{X}\mathtt{Y}\mathtt{Z}$ $\mathtt{a}\mathtt{b}\mathtt{c}\mathtt{d}\mathtt{e}\mathtt{f}\mathtt{g}\mathtt{h}\mathtt{i}\mathtt{j}\mathtt{k}\mathtt{l}\mathtt{m}\mathtt{n}\mathtt{o}\mathtt{p}\mathtt{q}\mathtt{r}\mathtt{s}\mathtt{t}\mathtt{u}\mathtt{v}\mathtt{w}\mathtt{x}\mathtt{y}\mathtt{z}$.
- Use `\mathrm` for roman font: $\mathrm{A}\mathrm{B}\mathrm{C}\mathrm{D}\mathrm{E}\mathrm{F}\mathrm{G}\mathrm{H}\mathrm{I}\mathrm{J}\mathrm{K}\mathrm{L}\mathrm{M}\mathrm{N}\mathrm{O}\mathrm{P}\mathrm{Q}\mathrm{R}\mathrm{S}\mathrm{T}\mathrm{U}\mathrm{V}\mathrm{W}\mathrm{X}\mathrm{Y}\mathrm{Z}$ $\mathrm{a}\mathrm{b}\mathrm{c}\mathrm{d}\mathrm{e}\mathrm{f}\mathrm{g}\mathrm{h}\mathrm{i}\mathrm{j}\mathrm{k}\mathrm{l}\mathrm{m}\mathrm{n}\mathrm{o}\mathrm{p}\mathrm{q}\mathrm{r}\mathrm{s}\mathrm{t}\mathrm{u}\mathrm{v}\mathrm{w}\mathrm{x}\mathrm{y}\mathrm{z}$.
- Use `\mathsf` for sans-serif font: $\mathsf{A}\mathsf{B}\mathsf{C}\mathsf{D}\mathsf{E}\mathsf{F}\mathsf{G}\mathsf{H}\mathsf{I}\mathsf{J}\mathsf{K}\mathsf{L}\mathsf{M}\mathsf{N}\mathsf{O}\mathsf{P}\mathsf{Q}\mathsf{R}\mathsf{S}\mathsf{T}\mathsf{U}\mathsf{V}\mathsf{W}\mathsf{X}\mathsf{Y}\mathsf{Z}$ $\mathsf{a}\mathsf{b}\mathsf{c}\mathsf{d}\mathsf{e}\mathsf{f}\mathsf{g}\mathsf{h}\mathsf{i}\mathsf{j}\mathsf{k}\mathsf{l}\mathsf{m}\mathsf{n}\mathsf{o}\mathsf{p}\mathsf{q}\mathsf{r}\mathsf{s}\mathsf{t}\mathsf{u}\mathsf{v}\mathsf{w}\mathsf{x}\mathsf{y}\mathsf{z}$.
- Use `\mathcal` for "calligraphic" letters: $\mathcal{A}\mathcal{B}\mathcal{C}\mathcal{D}\mathcal{E}\mathcal{F}\mathcal{G}\mathcal{H}\mathcal{I}\mathcal{J}\mathcal{K}\mathcal{L}\mathcal{M}\mathcal{N}\mathcal{O}\mathcal{P}\mathcal{Q}\mathcal{R}\mathcal{S}\mathcal{T}\mathcal{U}\mathcal{V}\mathcal{W}\mathcal{X}\mathcal{Y}\mathcal{Z}$ $\mathcal{a}\mathcal{b}\mathcal{c}\mathcal{d}\mathcal{e}\mathcal{f}\mathcal{g}\mathcal{h}\mathcal{i}\mathcal{j}\mathcal{k}\mathcal{l}\mathcal{m}\mathcal{n}\mathcal{o}\mathcal{p}\mathcal{q}\mathcal{r}\mathcal{s}\mathcal{t}\mathcal{u}\mathcal{v}\mathcal{w}\mathcal{x}\mathcal{y}\mathcal{z}$.
- Use `\mathscr` for script letters: $\mathscr{A}\mathscr{B}\mathscr{C}\mathscr{D}\mathscr{E}\mathscr{F}\mathscr{G}\mathscr{H}\mathscr{I}\mathscr{J}\mathscr{K}\mathscr{L}\mathscr{M}\mathscr{N}\mathscr{O}\mathscr{P}\mathscr{Q}\mathscr{R}\mathscr{S}\mathscr{T}\mathscr{U}\mathscr{V}\mathscr{W}\mathscr{X}\mathscr{Y}\mathscr{Z}$ $\mathscr{a}\mathscr{b}\mathscr{c}\mathscr{d}\mathscr{e}\mathscr{f}\mathscr{g}\mathscr{h}\mathscr{i}\mathscr{j}\mathscr{k}\mathscr{l}\mathscr{m}\mathscr{n}\mathscr{o}\mathscr{p}\mathscr{q}\mathscr{r}\mathscr{s}\mathscr{t}\mathscr{u}\mathscr{v}\mathscr{w}\mathscr{x}\mathscr{y}\mathscr{z}$.
- Use `\mathfrak` for "Fraktur" (old German style) letters: $\mathfrak{A}\mathfrak{B}\mathfrak{C}\mathfrak{D}\mathfrak{E}\mathfrak{F}\mathfrak{G}\mathfrak{H}\mathfrak{I}\mathfrak{J}\mathfrak{K}\mathfrak{L}\mathfrak{M}\mathfrak{N}\mathfrak{O}\mathfrak{P}\mathfrak{Q}\mathfrak{R}\mathfrak{S}\mathfrak{T}\mathfrak{U}\mathfrak{V}\mathfrak{W}\mathfrak{X}\mathfrak{Y}\mathfrak{Z}$ $\mathfrak{a}\mathfrak{b}\mathfrak{c}\mathfrak{d}\mathfrak{e}\mathfrak{f}\mathfrak{g}\mathfrak{h}\mathfrak{i}\mathfrak{j}\mathfrak{k}\mathfrak{l}\mathfrak{m}\mathfrak{n}\mathfrak{o}\mathfrak{p}\mathfrak{q}\mathfrak{r}\mathfrak{s}\mathfrak{t}\mathfrak{u}\mathfrak{v}\mathfrak{w}\mathfrak{x}\mathfrak{y}\mathfrak{z}$.

10. **Radical signs** Use `\sqrt`, which adjusts to the size of its argument: $\sqrt{x^3}$, $\sqrt[3]{\frac{x}{y}}$. For complicated expressions, consider using `\sqrt[1/2]{ ... }` instead.

11. Some **special functions** such as "lim", "sin", "max", "ln", and so on are normally set in roman font instead of italic font. Use `\lim`, `\sin`, etc. to make these: $\sin x$, $\sin x$, not $\sin x$ $\sin x$. Use subscripts to attach a notation to `\lim`: $\lim_{x \rightarrow 0}$

$$\lim_{x \rightarrow 0}$$

12. There are a very large number of **special symbols and notations**, too many to list here; see [this shorter listing](#), or [this exhaustive listing](#). Some of the most common include:

- `\lt` `\gt` `\le` `\ge` `\neq` $<$ $>$ \leq \geq \neq . You can use `\not` to put a slash through almost anything: $\not\lt$ $\not\lt$ but it often looks bad.
- `\times` `\div` `\pm` `\mp` \times \div \pm \mp . `\cdot` is a centered dot: $x \cdot y$
- `\cup` `\cap` `\setminus` `\subset` `\subseteq` `\supset` `\supseteq` `\in` `\notin` `\emptyset` `\varnothing` \cup \cap \setminus \subseteq \supseteq \in \notin \emptyset \varnothing
- `\{n+1 \choose 2k` or `\binom{n+1}{2k}` $\binom{n+1}{2k}$
- `\to` `\rightarrow` `\leftarrow` `\Rightarrow` `\Leftarrow` `\mapsto` \rightarrow \leftarrow \Rightarrow \Leftarrow \mapsto
- `\land` `\lor` `\not` `\forall` `\exists` `\top` `\bot` `\vdash` `\dashv` \wedge \vee \neg \forall \exists \top \bot \vdash \dashv
- `\star` `\ast` `\oplus` `\circ` `\bullet` \star \ast \oplus \circ \bullet
- `\approx` `\sim` `\simeq` `\cong` `\equiv` \approx \sim \simeq \cong \equiv
- `\infty` `\aleph_0` `\aleph_1` `\nabla` `\partial` `\Im` `\Re` ∞ \aleph_0 \aleph_1 ∇ ∂ \Im \Re
- For modular equivalence, use `\pmod` like this: $a \equiv b \pmod n$.

- `\ldots` is the dots in a_1, a_2, \dots, a_n `\cdots` is the dots in $a_1 + a_2 + \dots + a_n$
 - Some Greek letters have variant forms: `\epsilon` `\varepsilon` ϵ ε , `\phi` `\varphi` ϕ φ , and others. Script lowercase l is `\ell` ℓ .
- Detexify** lets you draw a symbol on a web page and then lists the $T_{E}X$ symbols that seem to resemble it. These are not guaranteed to work in MathJax but are a good place to start. To check that a command is supported, note that MathJax.org maintains a [list of currently supported \$L^A_T E_X\$ commands](#), and one can also check Dr. Carol JVF Burns's page of [\$T_{E}X\$ Commands Available in MathJax](#).
13. **Spaces** MathJax usually decides for itself how to space formulas, using a complex set of rules. Putting extra literal spaces into formulas will not change the amount of space MathJax puts in: `a_b` and `a_{b_b}b` are both ab . To add more space, use `\,` for a thin space $a\,b$; `\;` for a wider space $a\;b$. `\quad` and `\qquad` are large spaces: $a\quad b, a\qquad b$.
- To set plain text, use `\text{...}` : $\{x \in s \mid x \text{ is extra large}\}$. You can nest `$.$.` inside of `\text{...}` .
14. **Accents and diacritical marks** Use `\hat` for a single symbol \hat{x} , `\widehat` for a larger formula \widehat{xy} . If you make it too wide, it will look silly. Similarly, there are `\bar` \bar{x} and `\overline` \overline{xyz} , and `\vec` \vec{x} and `\overrightarrow` \overrightarrow{xy} and `\overleftarrow` \overleftarrow{xy} . For dots, as in $\frac{d}{dx}xx = \dot{x}^2 + x\ddot{x}$, use `\dot` and `\ddot` .
15. Special characters used for MathJax interpreting can be escaped using the `\` character: `\$` $\$$, `\{` $\{$, `_` $_$, etc. If you want `\` itself, you should use `\backslash` \backslash , because `\\` is for a new line.

(Tutorial ends here.)

It is important that this note be reasonably short and not suffer from too much bloat. To include more topics, please create short addenda and post them as answers instead of inserting them into this post.

(discussion) **(faq)** [\(mathjax\)](#) [\(reference\)](#)

edited May 1 at 9:52

community wiki
57 revs, 20 users 52%
MJD

-
- 12 Some capital Greek letters are the same as the Roman equivalents, so they are not separated in $L^A_T E_X$. For a capital beta, one must use something like `\mathrm{B}` : \mathbf{B} – [robjohn ♦](#) Aug 28 '12 at 2:06
-
- 36 for a beginner I find this [site](#) very helpful – [Monkey D. Luffy](#) Aug 28 '12 at 4:35
-
- 112 Thanks for putting this all together! – [J. M.](#) Aug 28 '12 at 11:03
-
- 3 Two related questions: [How do I insert a table when asking a question?](#) and [How to show the integral symbol on this site?](#) – [Martin Sleziak](#) Aug 28 '12 at 13:26
-
- 2 @Henning When I ranked features in my mind to decide whether to include them, `\varphi` and `\varepsilon` were very close to the threshold for inclusion. Martin Sleziak has since added them, which I agree is a good idea. – [MJD](#) Aug 28 '12 at 16:33
-
- 11 A quick addition to point 11: If you want to use a \sin -like symbol that is not already defined, the command is `\operatorname` : e.g., `\operatorname{Spec}` A gives $\operatorname{Spec} A$. – [Charles Staats](#) Aug 28 '12 at 16:45
-
- 6 It might be useful to mention hanging subscripts for things like `_5c_3` $_5C_3$. You could also mention `\frac` vs `\dfrac`. – [axblount](#) Aug 29 '12 at 18:09
-
- 3 My basic idea is that if a beginner can express a formula clearly, then someone else can come in and clean up the typesetting afterwards. I am considering getting rid of the section about `\big`, `\left`, and `\right` for this reason, and trimming the section on spacing. – [MJD](#) Aug 30 '12 at 2:06
-
- 5 Most of the references to TeX or LaTeX in this and the answers ought to be to MathJaX (the exception that I can see being the output of Detexify). I know this is a bit pedantic, but would it be alright to correct this? – [Loop Space](#) Sep 11 '12 at 14:13
-
- 2 @AndrewStacey Thanks for pointing this out. Let's by all means be as correct as possible, particularly when there's no extra cost. – [MJD](#) Sep 11 '12 at 14:15
-
- 4 @MJD Except that this is meant as a tutorial for those who aren't familiar with the distinction (and there really is a distinction: "slightly incompatible implementations" doesn't really fit the bill here). One thing tutorials often include is a "Where to find out more" section. This doesn't. Someone who doesn't know the distinction might be tempted to search for help on TeX or LaTeX instead and wonder why it doesn't work. – [Loop Space](#) Sep 11 '12 at 14:40
-
- 3 @axblount But that's precisely the wrong way around to think about it! The likelihood is that someone will look at this tutorial to figure out how to write something on the Maths-SX site: i.e., to use MathJaX. If they can't find help here, where do they go? If they have the idea that MathJaX is "just a javascript implementation of TeX" then they might think to look for help with TeX, but that is quite possibly *not* going to be helpful. – [Loop Space](#) Sep 11 '12 at 15:08
-
- 4 @axblount For a start, you've changed the goalposts: "LaTeX **math** expressions". LaTeX is so much more than just a way of typesetting maths! Second, I don't really know but it wouldn't take me long to cook one up. I don't use MathJaX so I haven't explored it. But I know, for example, that it can't handle catcode changes. Which means that I can't make `(` and `)` *automatically* resizeable. I can in LaTeX. – [Loop Space](#) Sep 11 '12 at 16:04
-
- 26 I wish I saw this post when I first joined. This post should be a main link on the home page. There should be a button under each box: NEW TO LATEX, CLICK HERE FOR EXAMPLES. This is extremely useful, concise. – [user1527227](#) May 31 '13 at 18:09
-
- 4 @MJD: I use `\mathrm` in many places; e.g. dx in integrals and derivatives and for operator names that don't need the full force of `\operatorname` . `\mathrm` was intended for roman symbols in math mode; `\text` was intended for text because of the way it spaces things. See [this TEX thread](#). Since I don't believe we can use preambles in MathJax, we can't use `\DeclareMathOperator` , though we can use `\newcommand` , but that is orthogonal to the use of `\mathrm` vs `\text` for math symbols. – [robjohn ♦](#) Jun 10 '13 at 16:23
-

Matrices

1. Use `$$\begin{matrix}...\end{matrix}$$` In between the `\begin` and `\end`, put the matrix elements. End each matrix row with `\\`, and separate matrix elements with `&`. For example,

```


$$
\begin{matrix}
1 & x & x^2 \\
1 & y & y^2 \\
1 & z & z^2
\end{matrix}


```

produces:

$$\begin{matrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{matrix}$$

MathJax will adjust the sizes of the rows and columns so that everything fits.

2. To add brackets, either use `\left... \right` as in section 6 of the tutorial, or replace `matrix` with

`pmatrix` $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$, `bmatrix` $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, `Bmatrix` $\left\{ \begin{matrix} 1 & 2 \\ 3 & 4 \end{matrix} \right\}$, `vmatrix` $\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix}$, `Vmatrix` $\left\| \begin{matrix} 1 & 2 \\ 3 & 4 \end{matrix} \right\|$.

3. Use `\cdots` \cdots , `\ddots` \ddots , `\vdots` \vdots when you want to omit some of the entries:

$$\begin{pmatrix} 1 & a_1 & a_1^2 & \cdots & a_1^n \\ 1 & a_2 & a_2^2 & \cdots & a_2^n \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 1 & a_m & a_m^2 & \cdots & a_m^n \end{pmatrix}$$

4. For "augmented" matrices, put parentheses or brackets around a suitably-formatted table; see [arrays](#) below for details. Here is an example:

$$\left[\begin{array}{cc|c} 1 & 2 & 3 \\ 4 & 5 & 6 \end{array} \right]$$

is produced by:

```


$$ \left[
\begin{array}{cc|c}
1&2&3\\
4&5&6
\end{array}
\right]


```

The `cc|c` is the crucial part here; it says that there are three centered columns with a vertical bar between the second and third.

5. For small inline matrices use `\bigl(\begin{smallmatrix} ... \end{smallmatrix}\bigr)`, e.g. $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ is produced by:

```


 $\bigl(\begin{smallmatrix} a & b \\ c & d \end{smallmatrix}\bigr)$ 


```

edited Jul 3 '15 at 18:06



Rory Daulton

26k 1 4

answered Aug 28 '12 at 4:17



MJD

39.1k 6 27 53

- 8 This says "End each matrix row with `\\`". But there is no reason to end the LAST row of the matrix that way. The double backslash means: now go on to the next row. But there isn't any next row after the last one. – [Michael Hardy](#) Aug 28 '14 at 5:15

Aligned equations

Often people want a series of equations where the equals signs are aligned. To get this, use

`\begin{align}...\end{align}`. Each line should end with `\\`, and should contain an ampersand at the point to align at, typically immediately before the equals sign.

For example,

$$\begin{aligned}
 \sqrt{37} &= \sqrt{\frac{73^2 - 1}{12^2}} \\
 &= \sqrt{\frac{73^2}{12^2} \cdot \frac{73^2 - 1}{73^2}} \\
 &= \sqrt{\frac{73^2}{12^2}} \sqrt{\frac{73^2 - 1}{73^2}} \\
 &= \frac{73}{12} \sqrt{1 - \frac{1}{73^2}} \\
 &\approx \frac{73}{12} \left(1 - \frac{1}{2 \cdot 73^2} \right)
 \end{aligned}$$

is produced by

```

\begin{align}
\sqrt{37} &= \sqrt{\frac{73^2-1}{12^2}} \\\
&= \sqrt{\frac{73^2}{12^2} \cdot \frac{73^2-1}{73^2}} \\\
&= \sqrt{\frac{73^2}{12^2}} \sqrt{\frac{73^2-1}{73^2}} \\\
&= \frac{73}{12} \sqrt{1 - \frac{1}{73^2}} \\\
&\approx \frac{73}{12} \left( 1 - \frac{1}{2 \cdot 73^2} \right)
\end{align}

```

The usual `$$` marks that delimit the display may be omitted here.

edited Apr 22 '15 at 7:36

answered Aug 28 '12 at 4:28



MJD

39.1k

6

27

53

-
- 2 The AMS's [Short Math Guide](#) recommends the `align` environment over `eqnarray` in LaTeX. In MathJax the spacing seems to be the same, but `align` requires one less ampersand per line. – [Rahul](#) Aug 28 '12 at 4:41
-
- 2 Thanks. I was not sure whether to discuss that. [A detailed argument against `eqnarray` is in this article.](#) – [MJD](#) Aug 28 '12 at 4:51
-
- Would you mind if I changed your example to use `align` then? – [Rahul](#) Aug 28 '12 at 5:34
-
- @Rahul: Please go ahead and change anything that seems good to change. This is all CW. – [MJD](#) Aug 28 '12 at 5:44
-
- Also, if you think you have a better example, please use it; I used the first one I found. – [MJD](#) Aug 28 '12 at 5:49
-
- 2 Correct me if I'm wrong, but I don't believe the `$$` is necessary before and after the `\begin{align}`. I've certainly never used it. From experience, the `\begin{align}` puts you into math-display mode by itself. – [TravisJ](#) Apr 21 '15 at 12:24
-
- Thanks, I did not know that. – [MJD](#) Apr 22 '15 at 7:37
-
- 1 I sometimes find that one line of this environment is too close to another, making them uncomfortable to read. The interline spacing can be adjusted by using input such as `\\[1ex]` instead of `\\`. (And of course the `1` can be changed to another value such as `1.5` or `.7` in order to get enough space but not too much.) – [David K](#) Jan 30 at 16:29
-

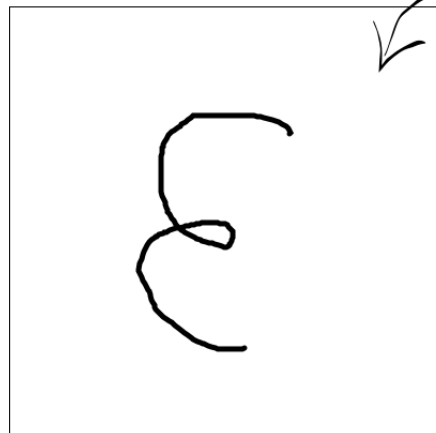
Symbols

In general, you have to search in long tables about a specific symbol you're looking for, things like Ψ , δ , ζ , \geq , \subseteq ... And it turns out that this operation can be frustrating and time consuming, which can cause the buddy to abandon writing the complete *L^AT_EX* sentence in his answer, or in some cases, the complete answer itself.

That's why the tool that I will present you in this post was conceived. Basically, it is a *L^AT_EX* *handwritten symbol recognition*. Example in image:

Detexify² - LaTeX symbol classifier

[classify](#) [symbols](#) [blog](#)



Draw here!

Did this help?

Hosting Detexify costs money and if it helps you may consider helping to pay the hosting bill.

Score: 0.0732728422365059
`\usepackage{ amssymb }`
`\mathcal{E}`
`mathmode`

Score: 0.0840035071153649
`\varepsilon`
`mathmode`

Score: 0.0939626071446543
`\usepackage{ tipa }`
`\textepsilon`
`textmode`

Score: 0.0948022041085201

clear

Here is the website: [Detexify²](#) No more frustration.

answered Oct 14 '13 at 20:15

community wiki
[user93957](#)

7 Amazing site!!! – [Silent](#) Oct 16 '13 at 3:30

2 Wow. Thanks! This really helped – [Siyanda](#) May 5 '14 at 20:59

Definitions by cases (piecewise functions)

Use `\begin{cases}...\end{cases}`. End each case with a `\\`, and use `&` before parts that should be aligned.

For example, you get this:

$$f(n) = \begin{cases} n/2, & \text{if } n \text{ is even} \\ 3n + 1, & \text{if } n \text{ is odd} \end{cases}$$

by writing this:

```
f(n) =
\begin{cases}
n/2, & \text{\text{if } $n$ is even} \\
3n+1, & \text{\text{if } $n$ is odd}
\end{cases}
```

The brace can be moved to the right:

$$\left. \begin{array}{l} \text{if } n \text{ is even: } n/2 \\ \text{if } n \text{ is odd: } 3n + 1 \end{array} \right\} = f(n)$$

by writing this:

```
\left.
\begin{array}{l}
\text{\text{if } $n$ is even:}&n/2\\
\text{\text{if } $n$ is odd:}&3n+1
\end{array}
\right\}
=f(n)
```

To get a larger vertical space between cases we can use `\\[2ex]` instead of `\\`. For example, you get this:

$$f(n) = \begin{cases} \frac{n}{2}, & \text{if } n \text{ is even} \\ 3n + 1, & \text{if } n \text{ is odd} \end{cases}$$

by writing this:

```
f(n) =
\begin{cases}
\frac{n}{2}, & \text{\text{if } $n$ is even} \\[2ex]
3n+1, & \text{\text{if } $n$ is odd}
\end{cases}
```

(An 'ex' is a length equal to the height of the letter x ; 2ex here means the space should be two exes high.)

edited Jan 25 at 22:09

 **MichaelChirico**
2,781 1 4

answered Aug 28 '12 at 4:34

 **MJD**
39.1k 6 27 53

@MJD Do we have to use the additional instruction `\displaystyle` when the formulas displayed are more complex? – [jibe](#) Jul 1 '14 at 14:43

@jibs `\displaystyle` is enabled automatically in displays, for example between $$$$$. You should not ever have to use it. – [MJD](#) Jul 1 '14 at 14:50

@jibe In general, the separate cases in this notation should be in text style unless they are very very complex (and then, the $\{$ notation is just wrong anyways). – [yo'](#) Aug 25 '14 at 9:53

Arrays

It is often easier to read tables formatted in MathJax rather than plain text or a fixed width font. Arrays and tables are created with the `array` environment. Just after `\begin{array}` the format of each column should be listed, use `c` for a center aligned column, `r` for right aligned, `l` for left aligned and `a` or `|` for a vertical line. Just as with matrices, cells are separated with `&` and rows are broken using `\\`. A horizontal line spanning the array can be placed before the current line with `\hline`.

For example,

n	Left	Center	Right
1	0.24	1	125
2	-1	189	-8
3	-20	2000	$1 + 10i$

```
$$
\begin{array}{c|lcr}
n & \text{Left} & \text{Center} & \text{Right} \\
\hline
1 & 0.24 & 1 & 125 \\
2 & -1 & 189 & -8 \\
3 & -20 & 2000 & 1+10i
\end{array}
$$
```

Arrays can be nested to make an array of tables.

For example,

min	0	1	2	3	max	0	1	2	3
0	0	0	0	0	0	0	1	2	3
1	0	1	1	1	1	1	1	2	3
2	0	1	2	2	2	2	2	2	3
3	0	1	2	3	3	3	3	3	3

Δ	0	1	2	3
0	0	1	2	3
1	1	0	1	2
2	2	1	0	1
3	3	2	1	0

As the source for the preceding array is long, please right-click on one of the tables and choose **Show Math As** ► **TeX Commands**.

edited Aug 28 '14 at 5:17

community wiki
8 revs, 6 users 47%
[robjohn](#)

5 You'll have to wrap the contents of each cell in `\text` if you don't want *allitalics, weird – lookingspacing, an'oddapostrophes*. – [Rahul](#) Aug 29 '12 at 21:30

@RahulNarain: True. I used words just for illustration, but I guess the example was slightly misleading. If you'd like to modify it please go ahead. – [axblount](#) Aug 29 '12 at 22:00

1 Thanks! I like your numeric example better, since the widths of the entries are different enough that the alignment differences are visually clear. – [MJD](#) Aug 30 '12 at 1:37

@robjohn how do you use `|` while typing, i don't find it in my keyboard..... – [ABC](#) Mar 28 '13 at 12:05

@exploringnet: on my keyboard, it is the shifted backslash. It may be in different places (or absent) depending on your keyboard. On my mobile device (iPhone), it is in the shifted numerics, to the right of the backslash. In mathmode, `\vert` gives `|` and `\mid` gives `|`, but neither works in the column spec for an array. If you cannot type it on your keyboard, you can always copy and paste it from another document. – [robjohn](#) ♦ Mar 28 '13 at 17:39

It should perhaps be mentioned, that in nested arrays there seems to be no option to synchronize column-widths and/or row-heights over the top-level. I didn't find a solution such that if two arrays are stacked vertically one could make their column-widths matching/fit. – [Gottfried Helms](#) Aug 26 '13 at 9:16

1 This could also be convenient for some people, although it destroys the joy of writing tables in *L^AT_EX* by hand! – [nullgeppetto](#) Jun 3 '14 at 14:18

@Rahul: why did regulars not press developers to enhance HTML formatting instead of doing inconvenient and resource-devouring detours through MathJax? When a table contains (mostly) formulæ, the use of a

formula-formatting engine looks determined. But when one wants *just a table*, why should it run software with completely different purpose? I once tried to speak about it at meta.SE, but was gagged. – [Incnis Mrsi](#) Dec 3 '14 at 12:11

@IncnisMrsi What kind of pressure could we apply: bribery, threats, kidnapping? A [feature request](#) was made, supported by SE communities, and declined by SE (on technical grounds, as they say). At least we have the MathJax workaround, with all of its flaws: SO and others have nothing. – [Meta](#) Dec 3 '14 at 15:55

Fussy spacing issues

These are issues that won't affect the correctness of formulas, but might make them look significantly better or worse. Beginners should feel free to ignore this advice; someone else will correct it for them, or more likely nobody will care.

Don't use `\frac` in exponents or limits of integrals; it looks bad and can be confusing, which is why it is rarely done in professional mathematical typesetting. Write the fraction horizontally, with a slash:

Bad	Better
$e^{i\frac{\pi}{2}} \quad e^{\frac{i\pi}{2}}$	$e^{i\pi/2}$
$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin x \, dx$	$\int_{-\pi/2}^{\pi/2} \sin x \, dx$

The `|` symbol has the wrong spacing when it is used as a divider, for example in set comprehensions. Use `\mid` instead:

Bad	Better
$\{x x^2 \in \mathbb{Z}\}$	$\{x \mid x^2 \in \mathbb{Z}\}$

For double and triple integrals, don't use `\int\int` or `\int\int\int`. Instead use the special forms `\iint` and `\iiint`:

Bad	Better
$\int \int_S f(x) \, dy \, dx$	$\iint_S f(x) \, dy \, dx$
$\int \int \int_V f(x) \, dz \, dy \, dx$	$\iiint_V f(x) \, dz \, dy \, dx$

Use `\,` to insert a thin space before differentials; without this *TEX* will mash them together:

Bad	Better
$\iiint_V f(x) dz dy dx$	$\iiint_V f(x) \, dz \, dy \, dx$

edited Jun 4 '13 at 15:47

community wiki
7 revs
MJD

- 2 I think the first adjusted fraction looks better than the original, but I don't like the second. In any case, this minor spacing imbalance is too peripheral to belong in a basic MathJax tutorial IMO. Too likely to scare people away rather than make them feel helped. – [Henning Makhholm](#) Aug 31 '12 at 21:05
- 1 @Henning Do you mean that the fraction example is too unimportant even to appear in an addendum on fussy spacing, or that the fussy spacing article is too unimportant to appear as an addendum to the tutorial? – [MJD](#) Aug 31 '12 at 23:57
- 1 I was talking specifically about the fraction example. Mostly I'm concerned that somebody will come away thinking, *Eeek! Do I have to worry about THAT to use the site?* But it's also arguable that the disclaimer at the top of the answer ought to take care of that. – [Henning Makhholm](#) Sep 1 '12 at 21:13
- 1 @MJD I like the less space, but what if we want to list the bounds for multiple integrals? Like if we have say 3 integrals and we have 3 separate bounds for each how would we list each one? Or do we have to do `\int_bound1^bound2\int_bound3^bound4\int_bound5^bound6??` – [TheHopefulActuary](#) Nov 19 '12 at 19:45
- @Kyle I think that's exactly what you do in that case. – [MJD](#) Nov 19 '12 at 20:09
- 16 Worth nothing you can use `\middle` with `|` to get it to work with `\left` and `\right`, like `\left\{x\middle| \frac{x^2}{2} \in \mathbb{Z}\right\}` – [asmeurer](#) Jun 9 '13 at 22:49
- Thanks very much! I wanted to do that, but didn't know how. – [MJD](#) Jun 10 '13 at 15:47

Colors

Named colors are browser-dependent; if a browser doesn't know a particular color name, it may render the text as black. The following colors are standard in HTML4 and CSS2 and should be interpreted the same by most browsers:

<code>\color{black}{text}</code>	<i>text</i>
<code>\color{gray}{text}</code>	<i>text</i>
<code>\color{silver}{text}</code>	<i>text</i>
<code>\color{white}{text}</code>	<i>text</i>
<code>\color{maroon}{text}</code>	<i>text</i>
<code>\color{red}{text}</code>	<i>text</i>
<code>\color{yellow}{text}</code>	<i>text</i>
<code>\color{lime}{text}</code>	<i>text</i>
<code>\color{olive}{text}</code>	<i>text</i>
<code>\color{green}{text}</code>	<i>text</i>
<code>\color{teal}{text}</code>	<i>text</i>
<code>\color{aqua}{text}</code>	<i>text</i>
<code>\color{blue}{text}</code>	<i>text</i>
<code>\color{navy}{text}</code>	<i>text</i>
<code>\color{purple}{text}</code>	<i>text</i>
<code>\color{fuchsia}{text}</code>	<i>text</i>

HTML5 and CSS 3 define [an additional 124 color names that will be supported on many browsers](#).

Math Stack Exchange's default style uses a light-colored page background, so avoid using light colors for text. Stick to darker colors like maroon, green, blue, and purple, and remember also that 7–10% of men are color-blind and have difficulty distinguishing red and green.

The color may also have the form `#rgb` where *r*, *g*, *b* are in the range `0–9`, `a–f` and represent the intensity of red, green, and blue on a scale of 0–15, with `a` =10, `b` =11, ... `f` =15. For example:

<code>#000</code>	<i>text</i>	<code>#00F</code>	<i>text</i>
<code>#F00</code>	<i>text</i>	<code>#F0F</code>	<i>text</i>
<code>#FF0</code>	<i>text</i>	<code>#FFF</code>	<i>text</i>

<code>#000</code>	<i>text</i>	<code>#005</code>	<i>text</i>	<code>#00A</code>	<i>text</i>	<code>#00F</code>	<i>text</i>
<code>#500</code>	<i>text</i>	<code>#505</code>	<i>text</i>	<code>#50A</code>	<i>text</i>	<code>#50F</code>	<i>text</i>
<code>#A00</code>	<i>text</i>	<code>#A05</code>	<i>text</i>	<code>#A0A</code>	<i>text</i>	<code>#A0F</code>	<i>text</i>
<code>#F00</code>	<i>text</i>	<code>#F05</code>	<i>text</i>	<code>#F0A</code>	<i>text</i>	<code>#F0F</code>	<i>text</i>
<code>#080</code>	<i>text</i>	<code>#085</code>	<i>text</i>	<code>#08A</code>	<i>text</i>	<code>#08F</code>	<i>text</i>
<code>#580</code>	<i>text</i>	<code>#585</code>	<i>text</i>	<code>#58A</code>	<i>text</i>	<code>#58F</code>	<i>text</i>
<code>#A80</code>	<i>text</i>	<code>#A85</code>	<i>text</i>	<code>#A8A</code>	<i>text</i>	<code>#A8F</code>	<i>text</i>
<code>#F80</code>	<i>text</i>	<code>#F85</code>	<i>text</i>	<code>#F8A</code>	<i>text</i>	<code>#F8F</code>	<i>text</i>
<code>#0F0</code>	<i>text</i>	<code>#0F5</code>	<i>text</i>	<code>#0FA</code>	<i>text</i>	<code>#0FF</code>	<i>text</i>
<code>#5F0</code>	<i>text</i>	<code>#5F5</code>	<i>text</i>	<code>#5FA</code>	<i>text</i>	<code>#5FF</code>	<i>text</i>
<code>#AF0</code>	<i>text</i>	<code>#AF5</code>	<i>text</i>	<code>#AFA</code>	<i>text</i>	<code>#AFF</code>	<i>text</i>
<code>#FF0</code>	<i>text</i>	<code>#FF5</code>	<i>text</i>	<code>#FFA</code>	<i>text</i>	<code>#FFF</code>	<i>text</i>

You can have a look [here for quick reference on colors in HTML](#).

edited Aug 11 '14 at 18:54

community wiki
6 revs, 3 users 70%
MJD

³ We should add that colors can be used on items other than text, such as variables and operators. The `'color'` command applies to the next item: surround anything longer with braces. – [Rory Daulton](#) Feb 21 '15 at 20:30

System of equations

- Use `\begin{array}...\end{array}` and `\left\{...\right\}`. For example, you get this:

$$\begin{cases} a_1x + b_1y + c_1z = d_1 \\ a_2x + b_2y + c_2z = d_2 \\ a_3x + b_3y + c_3z = d_3 \end{cases}$$

by writing this:

```


$$\begin{cases} a_1x + b_1y + c_1z = d_1 \\ a_2x + b_2y + c_2z = d_2 \\ a_3x + b_3y + c_3z = d_3 \end{cases}$$


```

- Alternatively we can use `\begin{cases}...\end{cases}`. The same system

$$\begin{cases} a_1x + b_1y + c_1z = d_1 \\ a_2x + b_2y + c_2z = d_2 \\ a_3x + b_3y + c_3z = d_3 \end{cases}$$

is produced by the following code

```


$$\begin{cases} a_1x + b_1y + c_1z = d_1 \\ a_2x + b_2y + c_2z = d_2 \\ a_3x + b_3y + c_3z = d_3 \end{cases}$$


```

- To align the $=$ signs use `\begin{aligned}...\end{aligned}` and `\left\{...\right.` (see asmeurer's comment)

$$\begin{cases} a_1x + b_1y + c_1z = d_1 + e_1 \\ a_2x + b_2y = d_2 \\ a_3x + b_3y + c_3z = d_3 \end{cases}$$

whose code is

```


$$\begin{aligned} \begin{cases} a_1x + b_1y + c_1z = d_1 + e_1 \\ a_2x + b_2y = d_2 \\ a_3x + b_3y + c_3z = d_3 \end{cases} \end{aligned}$$


```

- To align the $=$ signs and the terms as in

$$\begin{cases} a_1x + b_1y + c_1z &= d_1 + e_1 \\ a_2x + b_2y &= d_2 \\ a_3x + b_3y + c_3z &= d_3 \end{cases}$$

use `array` with `l` (for "align **left**"; there are also `c` and `r`) parameters

```


$$\begin{aligned} \begin{array}{l} a_1x + b_1y + c_1z = d_1 + e_1 \\ a_2x + b_2y = d_2 \\ a_3x + b_3y + c_3z = d_3 \end{array} \end{aligned}$$


```

- Vertical space between equations. As explained in [Definition by cases](#) to get a larger vertical space between equations we can use `\[2ex]` instead of `\`. The system

$$\begin{cases} a_1x + b_1y + c_1z = \frac{p_1}{q_1} \\ a_2x + b_2y + c_2z = \frac{p_2}{q_2} \\ a_3x + b_3y + c_3z = \frac{p_3}{q_3} \end{cases}$$

is generated by the following code

```


$$\begin{cases} a_1x + b_1y + c_1z = d_1 \\ a_2x + b_2y + c_2z = d_2 \\ a_3x + b_3y + c_3z = d_3 \end{cases}$$


```

in comparison with

$$\begin{cases} a_1x + b_1y + c_1z = \frac{p_1}{q_1} \\ a_2x + b_2y + c_2z = \frac{p_2}{q_2} \\ a_3x + b_3y + c_3z = \frac{p_3}{q_3} \end{cases}$$

whose code is

```


$$\begin{cases} a_1x + b_1y + c_1z = \frac{p_1}{q_1} \\ a_2x + b_2y + c_2z = \frac{p_2}{q_2} \\ a_3x + b_3y + c_3z = \frac{p_3}{q_3} \end{cases}$$


```

- In response to [elect's comment](#). The following code

```


$$\begin{aligned} & \left\{ \begin{array}{l} a_1x + b_1y + c_1z = \frac{p_1}{q_1} \\ a_2x + b_2y + c_2z = \frac{p_2}{q_2} \\ a_3x + b_3y + c_3z = \frac{p_3}{q_3} \end{array} \right. \end{aligned}$$


```

$$\theta = c_y - a_{y0} - d_{y0} \frac{(c_x - a_{x0}) \cdot d_{x0}}{\|d_{x0}\|^2} + c_y - a_{y1} - d_{y1} \frac{(c_x - a_{x1}) \cdot d_{x1}}{\|d_{x1}\|^2} + c_y - a_{y0} - d_{y0} \frac{(c_y - a_{y0}) \cdot d_{y0}}{\|d_{y0}\|^2} + c_y - a_{y1} - d_{y1} \frac{(c_y - a_{y1}) \cdot d_{y1}}{\|d_{y1}\|^2}$$

produces

$$\begin{cases} 0 = c_x - a_{x0} - d_{x0} \frac{(c_x - a_{x0}) \cdot d_{x0}}{\|d_{x0}\|^2} + c_x - a_{x1} - d_{x1} \frac{(c_x - a_{x1}) \cdot d_{x1}}{\|d_{x1}\|^2} \\ 0 = c_y - a_{y0} - d_{y0} \frac{(c_y - a_{y0}) \cdot d_{y0}}{\|d_{y0}\|^2} + c_y - a_{y1} - d_{y1} \frac{(c_y - a_{y1}) \cdot d_{y1}}{\|d_{y1}\|^2} \end{cases}$$

edited Jun 29 '15 at 11:10

community wiki
7 revs, 2 users 94%
Américo Tavares

Continued fractions

To make a continued fraction, use `\cfrac`, which works just like `\frac` but typesets the results differently:

$$x = a_0 + \frac{1^2}{a_1 + \frac{2^2}{a_2 + \frac{3^2}{a_3 + \frac{4^4}{a_4 + \cdots}}}}$$

Don't use regular `\frac` or `\over`, or it will look awful:

$$x = a_0 + \frac{1^2}{a_1 + \frac{2^2}{a_2 + \frac{3^2}{a_3 + \frac{4^4}{a_4 + \cdots}}}}$$

You can of course use `\frac` for the compact notation:

$$x = a_0 + \frac{1^2}{a_1 + \frac{2^2}{a_2 + \frac{3^2}{a_3 + \frac{4^4}{a_4 + \cdots}}}}$$

Continued fractions are too big to put inline. Display them with `$$... $$` or use a notation like $[a_0; a_1, a_2, a_3, \dots]$.

answered Aug 31 '12 at 19:46

community wiki
MJD

The RHS of the following continued fraction

$$\frac{a_1}{b_1 + \frac{a_2}{b_2 + \frac{a_3}{b_3 + \ddots}}} = \frac{a_1}{b_1} + \frac{a_2}{b_2} + \frac{a_3}{b_3} + \dots$$

can be typeset with the `\genfrac` command `'\genfrac{}{}{}{a_1}{b_1} {\genfrac{}{}{0pt}{}{+}} {\genfrac{}{}{}{a_2}{b_2}} {\genfrac{}{}{0pt}{}{+}} {\genfrac{}{}{}{a_3}{b_3}} {\genfrac{}{}{0pt}{}{+\dots}}'` – Américo Tavares Sep 17 '12 at 20:39

I wonder if something like $\frac{1}{2} + \frac{3}{4}$ would be good enough? It is much simpler.
(`\frac{12{\vphantom{1}}\atop+}\frac{34}`) – MJD Sep 17 '12 at 22:30

Yes, it is. I didn't mention it because in *User's Guide for the amsmath Package* it is written the following: "Note. For technical reasons, using the primitive fraction commands `\over`, `\atop`, `\above` in a LATEX document is not recommended (see, e.g., `amsmath.faq`)." – Américo Tavares Sep 17 '12 at 22:44

1 Happily, we are not writing $L^{\infty}_E X$ documents here. – MJD Sep 17 '12 at 22:44

4 Or write `\underset{j=1}{\overset{\infty}{\LARGE\mathrm K}}\frac{a_j}{b_j}=\cfrac{a_1}{b_1+\cfrac{a_2}{b_2+\cfrac{a_3}{b_3+\ddots}}}` to get

$$\prod_{j=1}^{\infty} \frac{a_j}{b_j} = \frac{a_1}{b_1 + \frac{a_2}{b_2 + \frac{a_3}{b_3 + \ddots}}}.$$

– Américo Tavares Jan 24 '13 at 9:15

1 @AméricoTavares Or use `\mathop` instead of `\overset` and `\underset`: `\mathop{\LARGE\mathrm K}_{i=1}^{\infty} \frac{a_i}{b_i}`

$$\prod_{i=1}^{\infty} \frac{a_i}{b_i}$$

– AlexR Feb 21 '15 at 20:48

@AlexR It's easier, thanks! – Américo Tavares May 17 '15 at 13:24

@AméricoTavares, Why don't you edit the answer and put this extremely helpful command into there, I think that would be more helpful. – Subhadeep Dey Jan 24 at 15:44

Crossing things out

Use `\require{cancel}` in the first formula in your post that requires cancelling; you need it only once per page. Then use:

$$\begin{aligned}y+\cancel{x} & y + \cancel{x} \\ \cancel{y+x} & \cancel{y+x} \\ y+\bcancel{x} & y + \bcancel{x} \\ y+\xcancel{x} & y + \xcancel{x} \\ y+\cancelto{0}{x} & y + \cancelto{0}{x}^0 \\ \frac{1\cancel{9}}{\cancel{9}5} = \frac{1}{5} & \frac{1\cancel{9}}{\cancel{9}5} = \frac{1}{5}\end{aligned}$$

Use `\require{enclose}` for the following:

$$\begin{aligned}\enclose{horizontalstrike}{x+y} & \cancel{x+y} \\ \enclose{verticalstrike}{\frac{xy}{x}} & \frac{xy}{\cancel{x}} \\ \enclose{updiagonalstrike}{x+y} & \canceluparrow{x+y} \\ \enclose{downdiagonalstrike}{x+y} & \canceldownarrow{x+y} \\ \enclose{horizontalstrike,updiagonalstrike}{x+y} & \canceluparrow{\cancel{x+y}}\end{aligned}$$

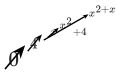
`\enclose` can also produce enclosing boxes, circles, and other notations; see [MathML `enclose` documentation](#) for a complete list.

edited Aug 4 '14 at 15:20

community wiki
4 revs
MJD

2 Can I use `\enclose{counterstrike}` ? :P – Akiva Weinberger Jul 27 '15 at 19:19

4 That sneaky $19/95 = 1/5$. Nice one! – Darth Geek Dec 8 '15 at 23:57

I see you can further resolve existing resolutions, 

– alan2here May 1 at 2:40

Additional decorations

$$\begin{aligned}\overline{} & \overline{A} \overline{AA} \overline{AAA} \\ \underline{} & \underline{B} \underline{BB} \underline{BBB} \\ \widetilde{} & \widetilde{C} \widetilde{CC} \widetilde{CCC} \\ \widehat{} & \widehat{D} \widehat{DD} \widehat{DDD} \\ \boxed{} & \boxed{E} \boxed{EE} \boxed{EEE} \\ \underleftarrow{} & \underleftarrow{F} \underleftarrow{FF} \underleftarrow{FFF} \\ \underrightarrow{} & \underrightarrow{G} \underrightarrow{GG} \underrightarrow{GGG} \\ \underleftrightharpoonup{} & \underleftrightharpoonup{H} \underleftrightharpoonup{HH} \underleftrightharpoonup{HHH} \\ \overbrace{} & \overbrace{(n-2) + (n-1) + n + (n+1) + (n+2)} \\ \underbrace{} & \underbrace{(n-2) + (n-1) + n + (n+1) + (n+2)}\end{aligned}$$

`\overbrace` and `\underbrace` accept a superscript or a subscript, respectively, to annotate the brace. For example, `\underbrace{a\cdots a}_{b\text{ times}}` is

$$\underbrace{a \cdot a \cdots a}_{b \text{ times}}$$

Additional accents

`\check` : \check{I}

`\acute` : \acute{J}

`\grave` : \grave{K}

edited Jun 9 '14 at 5:10

community wiki
6 revs, 4 users 71%
Américo Tavares

`\implies` (\implies) is a **marginally preferable** alternative to `\Rightarrow` (\Rightarrow) for implication.

There's also `\iff` (\iff) and `\impliedby` (\impliedby).

`\to` (\rightarrow) is preferable to `\rightarrow` or `\longrightarrow` for things like $f: A \rightarrow B$. The reverse is `\gets` (\leftarrow).

edited Feb 15 at 19:29

community wiki
3 revs, 3 users 75%
leonbloy

- 1 Why is it preferable? – **MJD** Jul 9 '13 at 20:00
- 10 `\implies` looks nicer as the arrow is longer and `\to` is quicker to right (and it's also what you say in your head while typing it). at least that's what I think. – **John Salvatierrez** Jul 29 '13 at 13:21
- 1 Remember the difference between `\to` and `\mapsto` as in $T: \mathbb{R} \rightarrow \mathbb{R}$, $x \mapsto x + 1$ produced by `T:\mathbb{R} \to \mathbb{R}; x \mapsto x+1` – **yo'** Aug 25 '14 at 9:57
- 3 I prefer using `\to` when it appears as part of a larger propositional formula, rather than at the top level, i.e. $p \wedge ((q \vee r) \rightarrow s)$, because the spacing is similar to that of other binary operators. `\implies` is better for sentence- or clause-level implications, or in displays, i.e.

$$x + 2 = 4 - x \implies x = 1.$$

– **Mario Carneiro** Feb 2 '15 at 14:22

Tags & References

For longer calculations (or referring to other post's results) it is convenient to use the tagging/labelling/referencing system. To tag an equation use `\tag{yourtag}`, and if you want to refer to that tag later on, add `\label{somelabel}` right after the `\tag`. It is not necessary that `yourtag` and `somelabel` are the same, but it usually is more convenient to do so:

`$$ a := x^2-y^3 \tag{*}\label{*} $$`

$$a := x^2 - y^3 \tag{*}$$

In order to refer to an equation, just use `\eqref{somelabel}`

`$$ a+y^3 \stackrel{\eqref{*}}{=} x^2 $$`

$$a + y^3 \stackrel{(*)}{=} x^2$$

or `\ref{somelabel}`

Equations are usually referred to as `\eqref{*}`, but you can also use `\ref{*}`.

Equations are usually referred to as **(*)**, but you can also use *****.

As you can see, references are even turned into hyperlinks, which you can use externally as well, e.g. **like this**. Note that you can also reference labels in other posts as long as they appear on the same site, which is especially useful when referring to a question with multiple equations, or when commenting on a post.

~~Due to a bug blocks containing a `\label` will break in preview, as a workaround you can put `\def\label#1{ }$` in your post while editing and remove that on submission — unfortunately this means you won't spot misspelled references before submitting... **Just don't forget to remove that `\def` again**~~

edited May 2 at 8:23

community wiki
2 revs
Tobias Kienzler

- 3 Also works in comments: `\eqref{*}` yields a clickable **(*)** – **Tobias Kienzler** Oct 31 '13 at 10:22

To enable automatically tagging your queations with incremental numbers, add `<script type="text/x-mathjax-config"> MathJax.Hub.Config({TeX: { equationNumbers: {autoNumber: "all"} } }); </script>` to your header. – **Gerald Senarclens de Grancy** Jan 20 at 20:56

@GeraldSenarclensdeGrancy That would however yield a global numbering on all answers to one question, not per-answer. And it would break the current expectation of by default not having tags despite using

Using \newcommand

I would like to remark that it is possible to define LaTeX commands as you do in your TeX files. I felt so happy when I first discovered it! It's enough to insert something like

```
$ \newcommand{\SES}[3]{ \ 0 \to \#1 \to \#2 \to \#3 \to 0 \ } $
```

at the top of your post (remember the dollars!). Then you can just use your commands as you are used to do: in my example typing `$$ \SES{A}{B}{C}` `$$` will produce the following:

$$0 \rightarrow A \rightarrow B \rightarrow C \rightarrow 0$$

It's also possible to use plain `\def` :

```
\def\ses#1#2#3{0 \to \#1 \to \#2 \to \#3 \to 0}
```

and then `$\ses{A}{B}{C}$` will produce the same output.

edited Feb 12 '15 at 12:43

community wiki
3 revs, 3 users 67%
Abramo

- Be aware that this affects the entire post, possibly even the frontpage, so it should be used **with great care**. – AlexR Feb 21 '15 at 20:55

Commutative diagrams

AMScd diagrams must start with a "require":

```
$\require{AMScd}$
\begin{CD}
A @>a>> B\\
@V b V V = @VV c V\\
C @>>d> D
\end{CD}
```

to get this diagram:

$$\begin{array}{ccc} A & \xrightarrow{a} & B \\ b \downarrow & = & \downarrow c \\ C & \xrightarrow{d} & D \end{array}$$

`@>>` is used for arrow right

`@<<<` is used for arrow left

`@VVV` is used for arrow down

`@AAA` is used for arrow up

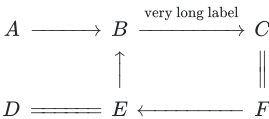
`@=` is used for horizontal double line

`@|` is used for vertical double line

`@.` is used for no arrow

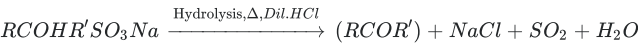
Another example:

```
\begin{CD}
A @>>> B @>{\text{very long label}}>> C \\
@. @AAA @| \\
D @=@ E @<<< F
\end{CD}
```



Long labels increase the length of the arrow and in this version also automatically increase corresponding arrows.

```
$\require{AMScd}$
\begin{CD}
RCOHR'SO_3Na @>{\text{Hydrolysis, $\Delta$, Dil.HCl$}}>> (RCOR')+NaCl+SO_2+H_2O
\end{CD}
```



edited Feb 4 at 15:04

community wiki
9 revs, 4 users 68%
Lehs

```
\begin{CD} RCOHR'SO_3Na @>\text{Hydrolysis, \Delta, Dil. HCl}>> (RCOR')+NaCl+SO_2+H_2O \end{CD}
```

Why does this code not give the correct output? – Quark Feb 4 at 10:04

@Quark: The main error was a missing bracket after HCl. – Lehs Feb 4 at 11:38

@Lehs Thanks. That was a silly mistake :) What if I wanted to write something below the arrow? Also, could you suggest some online website to learn MathJax? – Quark Feb 4 at 11:58

@Quark: then you move a > sign: @>>\text{very long label}>> I learn MathJax from the examples i.e. in this tread. – Lehs Feb 4 at 15:06

@Lehs Why did you rollback my edit...? You removed the formatting from the list, broke again (in Chrome) the example diagram, and reinserted your duplicate example. Why? – Najib Idrissi Feb 4 at 15:25

@NajibIdrissi: because your edit appeared as a mess in IE. The diagram wasn't even written out. Maybe there is something wrong in your or in my web-program. Now it looks good in IE. – Lehs Feb 4 at 15:44

@NajibIdrissi: Now it also looks good in Chrome for Windows and for Android, plus Safari for Androids. I don't know what the problem is with the current version. – Lehs Feb 4 at 15:56

Big braces

Use \left and \right to make braces - (round), [square] and {curly} - scale up to be the size of their arguments. Thus

```
$$
f\left(
\left[
\frac{
1+\left\{x,y\right\}
}{
\left(
\frac{x}{y}+\frac{y}{x}
\right)
\left(u+1\right)
\right]
+a
\right)^{3/2}
\right)
$$
```

renders as

$$f\left(\left[\frac{1+\{x,y\}}{\left(\frac{x}{y}+\frac{y}{x}\right)(u+1)}+a\right]^{3/2}\right).$$

Note that curly braces need to be escaped as \{ \} .

If you start a big brace with \left and then need to match that to a \right brace that's on a different line, use the forms \right. and \left. to make "shadow" braces. Thus,

```
$$
\begin{aligned}
a&=\left(1+2+3+\cdots\right.\\
&\quad\left.\cdots+\infty-2+\infty-1+\infty\right)
\end{aligned}
$$
```

renders as

$$a=\left(1+2+3+\cdots\cdots+\infty-2+\infty-1+\infty\right).$$

There is also a \middle construct which is useful when one has a mid-expression brace which must also scale up:

```
$$
\left\langle\middle|_q\middle|\frac{\frac{x}{y}}{\frac{u}{v}}\middle|\right\rangle_p
$$
```

renders as

$$\left\langle q\left\|\frac{\frac{x}{y}}{\frac{u}{v}}\right\|p\right\rangle.$$

Note that constructs like `\left\langle` , `\left|` and `\left\|` are also possible.

answered Oct 25 '13 at 17:47

community wiki
E.P.

Note: `\Big(... \Big)` produces $\left(\dots\right)$ but this bracket size is fixed in all situations unlike `\left(... \right)` which varies in size with its contents. `\Big` can be useful in various situations. – Nick Dec 19 '14 at 6:34

Arbitrary operators

If an operator is not available as a built-in command, use `\operatorname{...}` . So for things like

$$\operatorname{arsinh}(x)$$

write `\operatorname{arsinh}(x)` since `\arsinh(x)` will give an error and `arsinh(x)` has wrong font and spacing: *arsinh(x)*.

This was already mentioned in a comment by Charles Staats. You might consider this an addition to the FAQ section on `\lim` , `\sin` and so on.

For operators which need limits above and below the operator, use `\operatorname*{...}` , as in

$$\operatorname*{Res}_{z=1}\left(\frac{1}{z^2-z}\right)=1$$

edited Sep 16 '15 at 3:13

community wiki
2 revs, 2 users 62%
MvG

- We can also use `{\rm ...}`. For example, `{\rm arsinh}` yields *arsinh*. – Felix Marin Aug 12 '14 at 0:27
- 8 @Felix: `\rm` will change the font but not the spacing. `\operatorname{arsinh}x` renders as “*arsinh x*” while `{\rm arsinh}x` renders as “*arsinhx*”. Notice the added space between operator and operand in the first example, which is missing in the second. On the whole, I'd say that `operatorname` is a lot more in the spirit of semantic markup, declaring *what* you want to write instead of *how* you want to write it, so I'd strongly suggest using this. – MvG Aug 13 '14 at 11:27
- 3 Thanks. I didn't know there was a difference between them. I always avoided `operatorname` because it was too long. – Felix Marin Aug 13 '14 at 14:41
- 1 Thanks for this. I thought carefully about whether to put `\operatorname` in the main post, and decided to leave it out. The reason is simple: If a beginner omits `\operatorname` , the resulting formula will still be perfectly clear, and a more experienced user will have no trouble inserting the `\operatorname` where it is needed. So including it in the main post would not be a good use of space. – MJD Aug 16 '14 at 6:28
- 1 ... I always use “`text{operator}`” . Hmm, *arsinh x* vs *arsinh x*. – Jp McCarthy Feb 10 '15 at 16:48
- If you use the same operator many times, I think you can do `\DeclareMathOperator{\arsinh}{arsinh}` at the post's top. Never tried it though... – MickG Aug 15 '15 at 17:28

Limits

To make a limit (like $\lim_{x \rightarrow 1} \frac{x^2-1}{x-1}$), use this syntax:

First, start off with `$\lim` . This renders as *lim* . The backslash is there to prevent things like *lim*, where the letters are slanted.

Second, add `\limits_{x \to 1}` inside. The code now looks like `$\lim \limits_{x \to 1}$`, and renders as *lim*. The `\to` inside makes the right arrow, rendered as \rightarrow . The `_` makes the $x \rightarrow 1$ go underneath the *lim*. Finally, the pair of curly braces `{ }` makes sure that $x \rightarrow 1$ is treated as a whole object, and not two separate things.

Lastly, add the function you want to apply the limit to. To make the limit mentioned above, $\lim_{x \rightarrow 1} \frac{x^2-1}{x-1}$, simply use `$\lim \limits_{x \to 1} \frac{x^2-1}{x-1}$` .

And that is how you make a limit using MathJax.

edited Jul 17 '14 at 12:25

community wiki
2 revs, 2 users 94%
JChau

- 9 Why not just `\lim_{x \to 1}`

$$\lim_{x \rightarrow 1}?$$

As I understand it `\limits` is only needed for operations that don't already understand limits, for example if you want to use `+` and get

$$\sum_{i=1}^k \text{ instead of } +_{i=1}^k$$

When used inline, your suggestion will produce $\lim_{x \rightarrow 1}$ instead of the more compact form $\lim_{x \rightarrow 1}$ that mathjax normally chooses. Are you sure this is good advice? – MJD Feb 26 '14 at 14:10

@MJD $\lim_{x \rightarrow 1}$ renders to $\lim_{x \rightarrow 1}$, and $\limlimits_{x \rightarrow 1}$ renders as $\limlimits_{x \rightarrow 1}$. Note how the $x \rightarrow 1$ is separated from the first limit, and not directly underneath. We do not write limits like that in real life, so we use \limits . – JChau Feb 26 '14 at 16:19

I meant that the second limit renders to $\lim_{x \rightarrow 1}$ – JChau Feb 26 '14 at 16:28

6 Limits are usually written that way in typeset materials like papers and books when the limit is inline, rather than a displayed formula, and that's why MathJax typesets it that way. – MJD Feb 26 '14 at 16:41

4 The issue with this answer is that it is trying to "force" display mode on inline code. Doing so makes the text look less pretty. For example, see how the spacing between the lines change when I force display mode using $\limlimits_{x \mapsto 1} \frac{1}{x}$. On the other hand, when I let TeX do what it wants to do, using $\lim_{x \mapsto 1} \frac{1}{x}$, the spacing between the lines stays the same, which is much neater: $\lim_{x \rightarrow 1} \frac{1}{x}$. This is much easier on the eyes. If you want to make your math mode more prominent then take a new line using \displaystyle – user1729 Jul 17 '14 at 12:30

2 The moral is: TeX was written by a jolly clever chap. Let it do what it wants, because it does it for a reason! – user1729 Jul 17 '14 at 12:35

Part 11 of the "question" shows how to write limits in the way they were meant to be written in LaTeX and MathJax. – David K Nov 14 '15 at 23:17

Absolute values and norms

The absolute value of some expression can be denoted as $\left| x \right|$ or, more generally, as $\left| x \right|$. It renders as $|x|$.

The norm of a vector (or similar) can be denoted as $\left\| v \right\|$ or, more generally, as $\left\| v \right\|$. It renders as $\|v\|$. (You may also write $\left| \dots \right|$ instead.)

In both cases, the rendering is better than what you'd get from $|x|$ or $\|v\|$, which render with bars that don't descend low enough and sub-optimal spacing. At least on some browsers, so here is a screenshot how it looks for me, using Firefox 31 on OS X:

$$|x|, \|v\| \longrightarrow |x|, \|v\|$$

And here is the same formula rendered by your browser:

$$|x|, \|v\| \longrightarrow |x|, \|v\|$$

It was typeset as

$|x|, \|v\| \longrightarrow |x|, \|v\|$

edited Aug 13 '14 at 11:59

community wiki
4 revs, 3 users 89%
MvG

4 You can use $|x|$ instead of $\left| x \right|$; $\|x\|$ and $\left\| x \right\|$. (I don't think that there is a difference between them. I've tried [asking on SE](<http://tex.stackexchange.com/questions/77767/whats-the-correct-way-to-write-norm>). – Martin Sleziak Jun 24 '14 at 8:48

On my browser $|x|$ and $\left| x \right|$ ($|x|$ and $\left| x \right|$) look identical, contrary to your claim. Perhaps you need to show an example more complicated than just 'x'? – MJD Jun 24 '14 at 12:39

@MJD: What's your browser? I included a screenshot to support my claim. – MvG Aug 13 '14 at 11:24

Usually various versions of Firefox on either Linux or Windows. I happen to have Windows 8 booted now, so here's a screenshot from there: a.pomf.se/jrukq.PNG The bar height looks good on both pairs of symbols; the spacing is a little off for the $\left| \right|$ version. On Linux they looked the same. – MJD Aug 13 '14 at 17:02

Here's a screenshot with FF 31.0 under Linux: a.pomf.se/fhwmjo.png – MJD Aug 16 '14 at 6:23

Left and Right Implication Arrows

Another way to display the arrows for right and left implication instead of using

\rightarrow , \leftarrow and \Leftrightarrow

which produces \Rightarrow , \Leftarrow and \Leftrightarrow respectively, you can use

\implies for \Rightarrow , \impliedby for \Leftarrow and \iff for \Leftrightarrow

The latter of which produces longer arrows which may be more desirable to some.

Giving reasons on each line of a sequence of equations

To produce this:

$$\begin{aligned} v + w &= 0 \\ -w &= -w + 0 \\ -w + 0 &= -w + (v + w) \end{aligned}$$

Given
additive identity
equations (1) and (2)

(1)
(2)

write this:

```
\begin{align}
  v + w &= 0 && \text{\text{Given}} \tag{1}\\
  -w &= -w + 0 && \text{\text{additive identity}} \tag{2}\\
  -w + 0 &= -w + (v + w) && \text{\text{equations $(1)$ and $(2)$}}
\end{align}
```

edited Feb 15 at 18:33

community wiki
2 revs
David K

Long division

```
$$
\require{enclose}
\begin{array}{r}
      13 \quad \ll[-3pt] \\
4 \enclose{longdiv}{52} \quad \ll[-3pt] \\
\quad \underline{4}\phantom{2} \quad \ll[-3pt] \\
\quad \quad 12 \quad \ll[-3pt] \\
\quad \quad \underline{12} \\
\end{array}
$$
```

$$\begin{array}{r} 13 \\ 4 \overline{)52} \\ \underline{4} \\ 12 \\ \underline{12} \end{array}$$

One important trick shown here is the use of `` to make a blank space that is the same size and shape as the digit `2` just above it.

This is adapted from <http://stackoverflow.com/a/22871404/3466415> (which uses slightly different but not less valid formatting).

To highlight an equation, `\bbox` can be used. E.g,

```
$$ \bbox[yellow]
{
e^x=\lim_{n\to\infty} \left( 1+\frac{x}{n} \right)^n
\qquad (1)
}
$$
```

produces

$$e^x = \lim_{n \rightarrow \infty} \left(1 + \frac{x}{n} \right)^n$$

(1)

or

```
$$ \bbox[border:2px solid red]
{
e^x=\lim_{n\to\infty} \left( 1+\frac{x}{n} \right)^n
\qquad (2)
}
$$
```


produces

$$e^x = \lim_{n \rightarrow \infty} \left(1 + \frac{x}{n} \right)^n$$

(2)

The degree symbol for angles is *not* $\text{\textcircled{\scriptsize{0}}}$. Although many people use this notation, the result looks quite different from the canonical [degree symbol](#) shipped with the font:

90° renders as 90° while $90\text{\textcircled{\scriptsize{0}}}$ renders as 90° .

If your keyboard doesn't have a  key, feel free to copy from this post here, or follow [these suggestions](#).

Note that comments below indicate that on some configurations at least, $^\circ$ renders inferior to $\text{\textcircled{\scriptsize{0}}}$. And I recently had [a post of mine edited](#) just for the sake of turning $^\circ$ into $\text{\textcircled{\scriptsize{0}}}$, indicating that someone felt rather strongly about this. So the suggestion above does seem somewhat controversial at the moment. I maintain that from a semantic point of view, $^\circ$ is superior to $\text{\textcircled{\scriptsize{0}}}$, and if the rendering suffers from this, then it's a bug in MathJax. After all, LaTeX offers a proper degree symbol in the tex companion fonts, indicating that someone there, too, decided that $\text{\textcircled{\scriptsize{0}}}$ is not perfect. But if things are broken now, I can't fault people from pragmatically sticking with the rendering they prefer. Personally I prefer semantics, also for the sake of screen readers.

edited Jul 12 '15 at 6:28

community wiki
3 revs, 2 users 91%
MvG

If mathjax loads siunitx or gensymb, there is then \textdegree in latex which is the degree symbol. – [dustin](#) Feb 17 '15 at 22:29

@dustin: I couldn't find siunitx or gensymb mentioned anywhere in the MatJax source repository. Are they available as some kind of third-party extension? If so, where? Since MathJax is *not* LaTeX, packages can't be loaded unless they have been migrated. By the way, all occurrences of "degree" in the MathJax sources refer to something else, as far as I can tell, so there really doesn't seem to be a \textdegree macro. There should be one, imho. – [MvG](#) Feb 17 '15 at 23:39

I am not a mathjax expert. I just know latex. I just gave that suggestion in case they were available. [Siunitx](#) would be a great package to have. If you aren't familiar, you will see the advantage by scanning the documentation on ctan. – [dustin](#) Feb 17 '15 at 23:43

8 On my display, $^\circ$ looks bad and $\text{\textcircled{\scriptsize{0}}}$ looks good: [a.pomf.se/xnlfyg.png](#) – [MJD](#) Mar 24 '15 at 21:10

Pack of cards

If you are asking (or answering) a combinatorics question involving packs of cards you can make it look more elegant by using \spadesuit , \heartsuit , \diamondsuit , \clubsuit in math mode:

\spadesuit \heartsuit \diamondsuit \clubsuit

Or if you're really fussy:

$\text{\color{red}\heartsuit}$ and $\text{\color{red}\diamondsuit}$

$\text{\color{red}\heartsuit}$ $\text{\color{red}\diamondsuit}$

edited Feb 1 at 13:10

community wiki
2 revs, 2 users 83%
David

protected by [MJD](#) May 28 '15 at 17:18

Thank you for your interest in this question. Because it has attracted low-quality or spam answers that had to be removed, posting an answer now requires 10 [reputation](#) on this site.

Would you like to answer one of these [unanswered questions](#) instead?