Not-So-Frequently Asked Questions for \LaTeX

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This document addresses more esoteric issues in \LaTeX\ that have nonetheless actually arisen with the author. We hope that somebody will find it useful!

• Why is \LaTeX\ telling me that a command I use is undefined?

  **Answer.** Make sure that you’re using the \texttt{amsmath} package. This is included in \texttt{rsipacks.sty} (so it will automatically be included in your RSI paper and minipaper). To include it in other documents, put \texttt{\usepackage{amsmath}} in your preamble, before \texttt{\begin{document}}. Just to be safe, throw in \texttt{amssymb} and \texttt{amsthm} as well (so that you have all the fonts and symbols you would expect, and so that you can define theorems environments). If the command is a standard one, be sure that you spelled it correctly. If it’s a command you defined (or thought you did), make sure that you really defined it.

• How do I get script letters, like \( \mathcal{L} \), \( \mathcal{H} \), \( \mathcal{F} \), and \( \mathcal{G} \)?

  **Answer.** You need the \texttt{mathrsfs} package, so put \texttt{\usepackage{mathrsfs}} in your preamble. Then you can use the font name \texttt{mathscr} to get the desired font in math mode. For example, \texttt{\mathscr{L}} yields \( \mathcal{L} \).

• How do I typeset a series of displayed equations so that the equals signs line up?

  **Answer.** First, you need the \texttt{amsmath} package (see above). Once you have that, you use the \texttt{align}\* environment, like this :

\begin{verbatim}
\begin{align*}
math &= more math \\
&= more math \\
\end{align*}
\end{verbatim}
other math \le different math \\ 
&= yet more math 
\end{align*}

This will produce something like

\[
\sum_{i=1}^{n} \sum_{j=1}^{i} f(i, j) = \sum_{1 \leq i \leq n} f(i, j) \\
= \sum_{j=1}^{n} \sum_{i=j}^{n} f(i, j);
\]

\[
1 + 1 + 1 = 2 + 1 \\
= 3.
\]

You can replace the equals signs with whatever other appropriate symbol you like (\leq, \geq, \equiv, \subset, etc.). The important things to note are that you must put an & before each equals sign (or whatever) that you want aligned, and you need a double backslash (\\) whenever you want a new line. If you forget the double backslash, you may get something weird like this:

\[
1 + 1 + 1 = 2 + 1 = 3.
\]

• What if I want some/all of my aligned equations numbered?

**Answer.** Use \texttt{align} instead of \texttt{align*} to number all of the equations. (In general, * in an environment name means “without numbering”.) If you want one particular line not to have a number, put \texttt{\notag} on that line any place before the \texttt{\\}. Thus if you type something like this:

\begin{align}
\texttt{\begin{align}
    a &= b \\ \\
    &= c \texttt{\ notag} \ \ \\
    \texttt{\notag} 1+2+3+4 \\
    &= \texttt{\notag} 3+3+4 \ \\
    &= 6+4 = 10.
\end{align}}
\end{align}

then you’ll get something like this:

\[ a = b \]  
\[ = c \]  
\[ 1 + 2 + 3 + 4 = 3 + 3 + 4 \]  
\[ = 6 + 4 = 10. \]

(1)

(2)

• What if I want a bunch of equations in a row displayed, but not necessarily aligned?

**Answer.** Use the `gather*` (or `gather`) environment. It works exactly like `align*`, except that the equations aren’t aligned, so there’s no need for the `&`’s before your equals signs. For example, if you type this:

\begin{gather*}
\sum_{k=0}^n 1 = n+1, \\
1+1+1+1+1+1 = 7.
\end{gather*}

then you’ll get this:

\[ \sum_{k=0}^n 1 = n + 1, \]
\[ 1 + 1 + 1 + 1 + 1 + 1 = 7. \]

• What if I want to typeset a piecewise-defined function, like this?

\[ f(x) = \begin{cases} 
  x^2 - 2x + 1 & \text{if } x \text{ is irrational}, \\
  0, & \text{if } x \text{ is rational}. 
\end{cases} \]

**Answer.** You do it like this:

\[
\[ f(x) = \\
\begin{cases} 
  x^2 - 2x + 1 & \text{if } x \text{ is rational}, \\
  0, & \text{if } x \text{ is irrational}. 
\end{cases} 
\]

\]
A few things to note here: the double backslash (\) tells \LaTeX where your line endings are, as usual. We used the \text command so that \LaTeX would interpret the text in text mode. The \[ and \] exist so that this equation is centered and displayed on its own line (and so that it’s in math mode). (It’s equivalent to $$ ... $$.) Finally, the &’s are there so that the conditional text lines up. If we took them out, then our output would look like this:

\[
f(x) = \begin{cases} 
 x^2 - 2x + 1, & \text{if } x \text{ is rational,} \\
 0, & \text{if } x \text{ is irrational.}
\end{cases}
\]

Of course, you can have as many different cases as you want. However, like many good things in life, the \texttt{cases} environment requires the \texttt{amsmath} package.

- Why doesn’t \LaTeX like my prime signs?

\textbf{Answer.} The prime symbol (‘) in math mode is actually shorthand for the sequence “\texttt{\prime}”. (In math mode, \texttt{\prime} gives the prime sign, except that it’s enlarged, and not in a superscript, like this: ′.) If you put several primes in a row (as in a‘‘), then \LaTeX is okay and knows how to handle it. However, if for some reason you try to use an exponent and then a prime symbol (for instance, a‘\texttt{circ ‘}), trying to produce a◦‘), then \LaTeX will be unhappy because it thinks you have used a double exponent, and it doesn’t like that. You can appease it by replacing your ‘ with a \texttt{\prime} on the end of your exponent, like this: a\texttt{\circ \prime}.

- How can I cram multiple lines into the subscript of a summation symbol?

\textbf{Answer.} If it’s really necessary, you can use the \texttt{\substack} command, like this:

\[
\sum_{\substack{1 \le p \le n \\
p \text{ a prime}} } 1 \sim \frac{n}{\log n}.
\]

That will produce the following output:

\[
\sum_{\substack{1 \le p \le n \\
p \text{ a prime}}} 1 \sim \frac{n}{\log n}.
\]
This command requires the **amsmath** package.

- What if I have a huge equation that won’t fit on one line?

  **Answer.** If you only have one equals sign, then you have a few options. One is the **multiline** environment, which works like **gather**, except that the first line is aligned on the left, the last line is aligned on the right, and the middle lines are centered. You can also use the **split** environment within other environments; see **amslcdoc.pdf** (the documentation for **amsmath**) for more details.

  However, if the mess happens in a series of aligned equations, then the following solution is the best I know:

  \begin{align*}
  \text{normal} = & \text{ equation } \\
  \text{big} = & \text{ stuff + stuff + stuff } \\
  & + \text{ stuff + more stuff.}
  \end{align*}

  We’ve moved the &’s after the equals signs because we want the things right after the equals signs to line up. The \{} after each = is so that the spacing is correct. (If we leave out the \{}, then the + sign is a little farther to the left.) If you type that, you might end up with something like this:

  \[
  \det A = (-1)^{i+1} a_{i1} \det(A_{i1}) + \sum_{k\neq i} (-1)^{k+1} a_{k1} \det(A_{k1})
  = (-1)^{i+1} (b_{i1} + c_{i1}) \det(A_{i1})
  + \sum_{k\neq i} (-1)^{k+1} a_{k1} \left[\det(B_{k1}) + \det(C_{k1})\right].
  \]