

This note gives a few guidelines you should follow when using latex, and some examples on how to do certain common things (like commutative diagrams). Look at the source of this file to see how the examples are done.

1 Some things to do and to avoid

What follows are mainly opinions of style, but I think they're widely agreed upon.

1. Do not begin sentences (or phrases) with math, and do not put math next to math. This is just to make things easier to read. You should not write:

Suppose X is a topological space and x is a point in X . Since $x \in X$, $\pi_1(X, x)$ is defined. $\pi_1(X, x)$ is a group.

Problems: in the second sentence, $x \in X$ and $\pi_1(X, x)$ occur directly next to each other but are not part of the same equation; also, the final sentence begins with math, which is no good. To fix these problems without changing the structure of the sentences, I'd write

Suppose X is a topological space and x is a point in X . Since $x \in X$, we have that $\pi_1(X, x)$ is defined. Then $\pi_1(X, x)$ is a group.

The idea is just to put in some filler words/phrases to separate the math. This makes the math more spaced out and easier to read, though it can make the writing a bit dry. It's best to try to structure sentences to avoid these filler words while still following the rule.

2. "Romanize" the names of operators and multi-letter functions. Write $\sin(x)$ and not $\sin(x)$. You can define commands in latex to typeset your own operator names correctly, for example `\End(V)`.

3. Use the correct size of parenthesis, braces, brackets, etc. The commands `\left` and `\right` as well as `\big` and `\bigg` are useful for this. Some examples:

$$\left(x + \left(y + \frac{a}{b}\right)^2\right)^{-1}$$
$$\left\{\frac{x}{y} \mid y \text{ is not a power of } 2\right\}$$

(Here the `\,` in the source is to add some space around the middle line.) Different size parentheses:

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4. If you're going to put two equations in one `displaymath` environment, put some space between them. You can do this with `\quad` or `\qquad` (or other commands like `\hspace`). So, do not write:

$$b = 1 + \sum_{i=1}^{10} a_i, c = x + y + z$$

but instead:

$$b = 1 + \sum_{i=1}^1 0a_i, \quad c = x + y + z$$

5. Change the margins! The default margins are much too big. Copy the lines from the header of this file, or do it yourself.

6. Put big equations in displaymath environments and not inline. Example:

$$\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6}.$$

2 Matrices

Matrices are perhaps most easily done use the array environment, with the `\left` and `\right` commands to get parentheses/brackets around them. Examples:

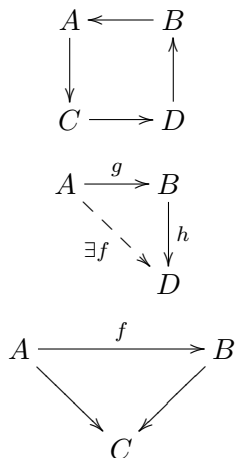
$$\begin{bmatrix} 1 & 2 & 3 \\ x & y & z \\ p & q & r \end{bmatrix}, \quad \begin{pmatrix} A & B \\ C & D \end{pmatrix}$$

I use a macro `\mat` and `\vec` for doing rank 2 matrices and vectors:

$$\begin{pmatrix} A & B \\ C & D \end{pmatrix} \cdot \begin{pmatrix} x \\ y \end{pmatrix}.$$

3 Commutative diagrams

There are various packages to do commutative diagrams. I usually use `xypic`. I think it typically comes standard, so you shouldn't need to download anything to use it, just put the appropriate `usepackage` command at the top of your tex file. Here are some examples.



4 Cases

Here's how to make a formula with cases:

$$f(x) = \begin{cases} \phi(x) & \text{for } x \in [0, 1] \\ \psi(x) & \text{for } x \in [1, 2] \\ \eta(x) & \text{for } x \in [2, 3] \end{cases}$$

5 Multi-line equations

Here's how to put a bunch of equations together, nicely aligned.

$$\begin{aligned}\left[\int_{-\infty}^{\infty} e^{-t^2} dt\right]^2 &= \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} e^{-(x^2+y^2)} dx dy \\ &= \int_0^{\infty} \int_0^{2\pi} e^{-r^2} r d\theta dr \\ &= 2\pi \int_0^{\infty} r e^{-r^2} dr \\ &= \pi\end{aligned}$$