Latex Tutorial

9/10/2020

Outline

Basics

1. Latex is a stable dispersion (emulsion) of polymer microparticles in water. (Wikipedia)
2. LaTeX is pronounced "Lay-tech" and will henceforth be written as "latex" when convenient.

Templates

1. Lots of templates online, feel free to pick around till you get one you like.

Compilers

1. www.overleaf.com is pretty good. Benefits include easy collaboration and auto-complete.
2. texshop or other offline compilers have the advantage that there's no internet, so it can sometimes be easier to compile larger files or ones that have lots of images.

Starting out

The following document compiles:

```
\documentclass[12pt]{article}
\begin{document}
Hello world. $25=5^2$.
\end{document}
```

Packages

Often you want to do something cool and chances are someone else already did.
To add a document, before the `\begin{document}` line add something like: `\usepackage{amsmath}`
This package gives you lots of math symbols, for instance $\mathbb{R}$ is described by

```
$$\mathbb{R}$$
```

Physics

The "physics" package has slightly simpler commands for matrices, derivatives and more.

```
\mqty[...] or \mqty(...) instead
of \begin{pmatrix}...\end{pmatrix}
and \begin{bmatrix}...\end{matrix}
```

Similarly, partial derivatives can be typed faster,

```
\dv[2]{x}, \pdv{f}{x}, \pdv{f}{x}{y}
```

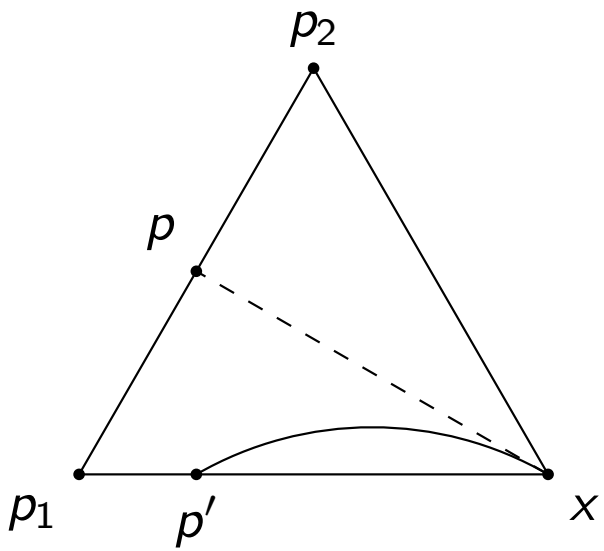
turns into

$$\frac{\mathrm{d}^2}{\mathrm{d}x^2}, \frac{\partial f}{\partial x}, \frac{\partial^2 f}{\partial x \partial y}$$

Short summary pdf found online:
mirrors.ibiblio.org/CTAN/macros/latex/contrib/physics/physics.pdf

tikz

In short you can make more professional sketches, like the following.

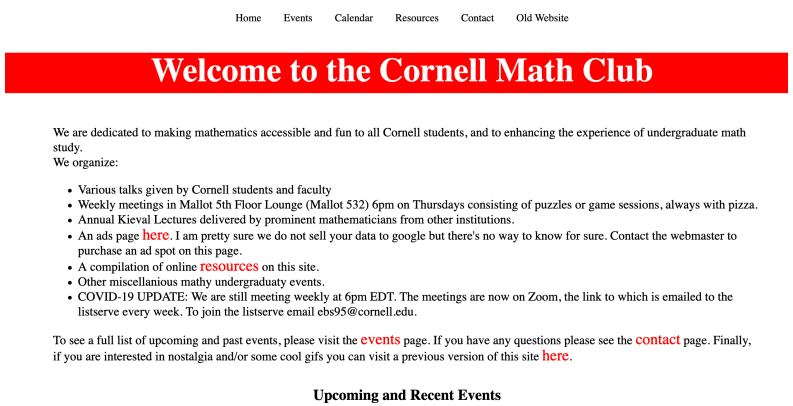


graphicx

It's pretty easy to insert images with

```
\includegraphics[width=50mm]{figure.png}
```

Example:



enumitem

Often there will be multiple parts in a math problem. "enumitem" package gives you a nice way to do this.

```
\begin{enumerate}[label=\alph*]
    \item Hello
    \item Goodbye
\end{enumerate}
```

That compiles to

a. Hello

b. Goodbye

Need to find a symbol?

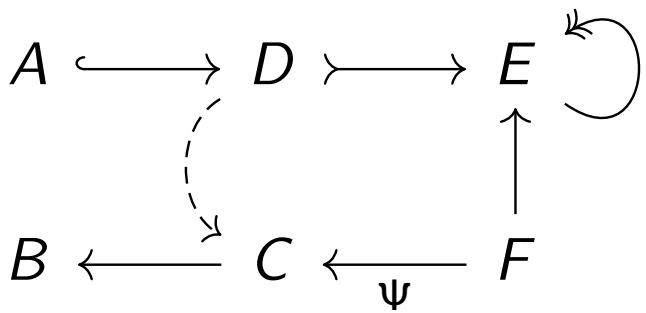
1. If you can draw it but want the code - detexify (https://detexify.kirelabs.org/classify.html)
2. If you know the common name, googling is fairly effective (or use DuckDuckGo for more privacy and lower quality)

Spacing

```
\\ is short for the newline command.
\quad and \qquad insert 4 and 8 spaces,
which can be useful for equations etc.
```

Commutative Diagrams

tikz-cd is solid but can be time consuming.
Highly recommend https://tikzcd.yichuanshen.de/.
It translates drawings into the package tikz-cd.
Example (took 30 seconds to draw):



Presentations with Beamer

1. This slideshow was created in Beamer.
2. If slides aren't compiling try adding "fragile" tag

```
\begin{frame}[fragile]{title}
```

3. If you would like, copy and paste this code to get started.

Macros

Certain things are sometimes annoying to type. You can add your own command by something like

```
\newcommand{\R}{\mathbb{R}}
```

Dynamic updating

$$3+4=7 \tag{1}$$

Look at equation (1).
Code for the above stuff:

```
\begin{equation}
3+4=7
\label{hello}
\end{equation}\\
```

You can do similar things with theorems etc. by adding

```
\label{falsetheorem}
```

and then reference it by

```
The result follows from Theorem \label{falsetheorem}
```

Bibliographies

1. There's a couple ways of doing bibliographies.