

First LaTeX Attempt

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September 4, 2014

This is a paragraph. My first one in L^AT_EX. They just need to be separated by blank lines.

These are meta characters, so, need to be escaped: {, }, \$, -, %, #, &
Backslash is special: \textbackslash

We have a hyphen -, endash –, and an emdash — .

We have *emphasis*,

The \$ puts you into mathematics mode in a paragraph of regular text:
 $f : R \rightarrow R$

So, I suppose this is for indented math expressions (note the super and subscripts in math mode)

$$|f(y) - f(x)| < \epsilon$$

$$p_i = p_{i-1}^2$$

In text mode, the ^ is for character composition: Ô

Left- and right- quotes are distinguished. They are formed with 2 back-ticks, “, and single-quotes, ”. ”Let’s see what regular double-quotes yield. Ah. Left quotes.”

Some common control characters:

→ → ←

Note, the line comment is more; it also ignore the newline, and any leading whitespace on the next line.

{ } are used for grouping: *This is the emphasis tag.*

Let’s see if we can get a superscript on a subscript: T_{n^2}

1 This is a Section

1.1 This is a Subection

1.2 And Another

This Section Doesn't Have a Number

Does this subsection?

1.3 Ah, unnumbered sections do not affect the numbering.

Font Families (Typefaces)

Well, This is Roman family This is Sans Serif family This is typewriter (true type) family

Font Shapes

We have: upright text (default) *Italics* *Slanted*, somehow different than *italics?*, and WE HAVE COOL SMALL-CAPS, TOO. NICE.

Font Sizes

This is tiny

This is scriptsize

This is footnotesize

This is small

This is normalsize

This is large

This is Large

This is LARGE

This is huge

This is Huge

Accents and Such through Control Sequences

I dunno, those Size things seemed to persist

Sí, mathématique

Hasta Mañana, Piękos. Kurt Gödel. We have dotless is and js

There be others, of course.

Math

Common control chars: $\times \div \circ \cap \cup \dagger \ddagger \otimes \exists \forall \neg \mid \mathfrak{b} \mathfrak{h} \mathfrak{H}$

Numbering Equations

$$x + y = 17 \tag{1}$$

$$y = 3x - 42 \tag{2}$$

Functions

$$\cos(\theta + \phi) = \cos \theta \cos \phi - \sin \theta \sin \phi$$

We can create ones not in the list: `foox`

Embedding Text in Math

$$M^\perp = \{f \in V' : f(m) = 0 \text{ for all } m \in M\}.$$

Fractions & Roots

The roots of a quadratic polynomial $ax^2 + bx + c$ with $a \neq 0$ are given by the formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

The roots of a cubic polynomial of the form $x^3 - 3px - 2q$ are given by the formula

$$\sqrt[3]{q + \sqrt{q^2 - p^3}} + \sqrt[3]{q - \sqrt{q^2 - p^3}}$$

where the values of the two cube roots must be chosen so as to ensure that their product is equal to p .

We have 2 types of ellipsis...

$$\frac{1 - x^{n+1}}{1 - x} = 1 + x + x^2 + \cdots + x^n$$

Brackets & Norms

Left and right $()$, $\{\}$, $[]$, of appropriate size:

$$\left|4x^3 + \left(x + \frac{42}{1+x^4}\right)\right|.$$

$$\left.\frac{du}{dx}\right|_{x=0}.$$

Multiline Formulae

$$\cos 2\theta \quad = \quad \cos^2 \theta - \sin^2 \theta \tag{3}$$

$$= \quad 2 \cos^2 \theta - 1. \tag{4}$$

The asterisk suppresses equation numbering:

If $h \leq \frac{1}{2}|\zeta - z|$ then

$$|\zeta - z - h| \geq \frac{1}{2}|\zeta - z|$$

and hence

$$\begin{aligned} \left| \frac{1}{\zeta - z - h} - \frac{1}{\zeta - z} \right| &= \left| \frac{(\zeta - z) - (\zeta - z - h)}{(\zeta - z - h)(\zeta - z)} \right| \\ &= \left| \frac{h}{(\zeta - z - h)(\zeta - z)} \right| \\ &\leq \frac{2|h|}{|\zeta - z|^2}. \end{aligned}$$

Matrices

The *characteristic polynomial* $\chi(\lambda)$ of the 3×3 matrix

$$\begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix}$$

is given by the formula

$$\chi(\lambda) = \begin{vmatrix} \lambda - a & -b & -c \\ -d & \lambda - e & -f \\ -g & -h & \lambda - i \end{vmatrix}.$$

Now we can describe piecewise-defined functions (remember, `mbox` is used to embed text in math):

$$|x| = \begin{cases} x & \text{if } x \geq 0; \\ -x & \text{if } x < 0. \end{cases}$$

Derivatives, Limits, Sums and Integrals

Derivatives, now that we know fractions, are nothing special:

$$\frac{\partial u}{\partial t} = h^2 \left(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} \right)$$

Limits and such:

$$\lim_{x \rightarrow +\infty}, \inf_{x > s} \text{ and } \sup_K$$

Sums: $\sum_{k=1}^m k^2 = \frac{m(m+1)(2m+1)}{6}$

Think we have products, too? $\prod_{i=1}^m i = m!$. Cool.

And we have integrals:

$$\int_0^{+\infty} x^n e^{-x} dx = n!.$$

$$\int \cos \theta d\theta = \sin \theta + c.$$

$$\int_{x^2+y^2 \leq R^2} f(x, y) dx dy = \int_{\theta=0}^{2\pi} \int_{r=0}^R f(r \cos \theta, r \sin \theta) r dr d\theta.$$

In some multiple integrals (i.e., integrals containing more than one integral sign) one finds that LaTeX puts too much space between the integral signs. The way to improve the appearance of the integral is to use the control sequence `\int\!\!\int` to remove a thin strip of unwanted space

$$\int_0^1 \int_0^1 x^2 y^2 dx dy.$$

$$\iint_D f(x, y) dx dy.$$

Lists

We have ordered lists:

1. *Geno's*, not Pat's
2. Order steak:
 - (a) Say "Steak"
 - (b) Say "with", if you want onions
 - (c) Tell which type of cheese
3. You don't have all night, gotta eat it before it gets cold

And bulleted lists:

- Toothbrush
- Knife
- Bathing suit
- Documents
 - passport
 - dive log
- Sunglasses

Finally, descriptive lists:

halyard Line that raises a sail

sheet Line that trims a sail

reefing line Line rigged to (effectively) shorten a sail

furler Line that furls a sail (if it's so rigged). E.g., if the main furls around the mast, you leave the halyard be, release the furling line, and use the outhaul to "put up" (pull out) the main, and the furler to pull it back in. Convenient, but the sail is, necessarily, flatter than we'd like it to be. Works much better for a foresail.

Quotes

Use quote for shorter quotes:

Anti-intellectualism has been a constant thread winding its way through our political and cultural life, nurtured by the false notion that democracy means that ‘my ignorance is just as good as your knowledge.’

–Isaac Asimov

Use quotation for longer quotes. This is from the story “Flight”, by John Steinbeck.

The dawn came and the heat of the day fell on the earth, and still Pepe slept. Late in the afternoon his head jerked up. He looked slowly around. His eyes were slits of weariness. Twenty feet away in the heavy brush a big tawny mountain lion stood looking at him. Its long thick tail waved gracefully; its ears were erect with interest, not laid back dangerously. The lion squatted down on its stomach and watched him.

Pepe looked at the hole he had dug in the earth. A half-inch of muddy water had collected in the bottom. He tore the sleeve from his hurt arm, with his teeth ripped out a little square, soaked it in the water and put it in his mouth. Over and over he filled the cloth and sucked it.

Still the lion sat and watched him. The evening came down but there was no movement on the hills. No birds visited the dry bottom of the cut. Pepe looked occasionally at the lion. The eyes of the yellow beast drooped as though he were about to sleep. He yawned and his long thin red tongue curled out. Suddenly his head jerked around and his nostrils quivered. His big tail lashed. He stood up and slunk like a tawny shadow into the thick brush.

A moment later Pepe heard the sound, the faint far crash of horses’ hoofs on gravel. And he heard something else, a high whining yelp of a dog.

Tables

The first five International Congresses of Mathematicians were held in the following cities:

| | | |
|------------|-------------|------|
| Chicago | U.S.A. | 1893 |
| Zürich | Switzerland | 1897 |
| Paris | France | 1900 |
| Heidelberg | Germany | 1904 |
| Rome | Italy | 1908 |

We can even get some borders:

| n | $n!$ |
|-----|---------|
| 1 | 1 |
| 2 | 2 |
| 3 | 6 |
| 4 | 24 |
| 5 | 120 |
| 6 | 720 |
| 7 | 5040 |
| 8 | 40320 |
| 9 | 362880 |
| 10 | 3628800 |

2 Embedding Images

Note the `graphicx` package, included above.

Sadly, the type of image you embed depends upon your target type. If the final output is a Postscript (using `dvips`), then embed only PostScript (Encapsulated PostScript) images. If the target is PDF, then you can include PDF, PNG, JPEG, or GIF.



Figure 1: A fun example picture