

# L<sup>A</sup>T<sub>E</sub>X

Math 130 Linear Algebra  
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L<sup>A</sup>T<sub>E</sub>X is a typesetting program. I use it to produce all my notes for classes. It's much better for anything that uses mathematical notation than any wordprocessor. L<sup>A</sup>T<sub>E</sub>X is used by publishers for research journals in science and math as well as many textbooks. The disadvantage of L<sup>A</sup>T<sub>E</sub>X is that you have to know more about it to use it. It's worth it.

Look at the source file for this note. It's in the file `latex.tex`. You're reading the file `latex.pdf`. In order to convert the source file, I use a latex program on our linux machines in the department lab. I just gave it the instruction

```
pdflatex latex.tex
```

and it created the pdf file you're reading. The `latex.tex` file itself I created using a simple editor.

The best way to learn how to use L<sup>A</sup>T<sub>E</sub>X is to look at documents and their source files. There are also lots of books on how to use it, and if you're going to use L<sup>A</sup>T<sub>E</sub>X a lot, you'll want to get one. But for just writing up homework assignments, you won't need to know much.

**Parts of a L<sup>A</sup>T<sub>E</sub>X source file.** You need to declare the kind of document at the beginning of the file. This one has

```
\documentclass {article}
```

on it because it's just a short article. That's all you need to write up homework and other short things. Next is

```
\begin{document}
```

and at the very end of the file there's a matching

```
\end{document}
```

This document has a title section, and I put that in so you could see how to create titles. Notice how the double backslash forces a new line in the title.

**Creating mathematical expressions.** One of the main reasons to use L<sup>A</sup>T<sub>E</sub>X is to make the mathematical expressions look right. Traditionally, variables like *a* and *x* are in italic fonts in printed texts to distinguish them from letters a and x. It doesn't matter whether they're really variables or constants, so, for instance, *e* should always appear in italics when it means that number about 2.71. Also, spaces should appear before and after plus, minus, and equal signs as in the equation  $x^2 + 3x - 2/3 = 0$ , but not when multiplication or division are used, and of, course, the exponent 2 in  $x^2$  has to be raised and in a smaller size.

With a word processor, you have to be constantly fiddling with the fonts, spacing, size, and position to get mathematical expressions to look right, but it's all taken care of in L<sup>A</sup>T<sub>E</sub>X. Just put dollar signs before and after the expression to indicate that it's a mathematical expression. To get  $x^2 + 3x - 2/3 = 0$ , just use

```
 $x^2+3x-2/3=0$ 
```

Sometimes you want to display a large equation on a separate line. Delimit the equation with double dollar signs for that. For example, to get

$$\int_2^3 \frac{\sqrt{x^2 - 4}}{x} dx = \sqrt{5} - 2 \arccos \frac{2}{3}$$

use

$$\int_2^3 \frac{\sqrt{x^2-4}}{x} dx = \sqrt{5}-2 \arccos \frac{2}{3}$$

Note how easy square roots, division, and integrals are.