

Math 480: Lectures 11 – Latex (2 of 3)

William Stein

April 20, 2016

Contents

1	Math formulas	1
1.1	Some basics	2
1.2	Using Sage	2
1.3	Use Some random webpage	3
2	Sectioning and cross referencing	3
3	Including graphics	3

Reminders

Some reminders:

1. Start screencast!
2. You should open `lectures/2016-04-20/2016-04-20.tex` in your project
3. Homework and peer grading due Friday at 6pm. (Questions?)

1 Math formulas

\LaTeX is massively different than Microsoft Word. You focus entirely on the content and structure of what you are writing, not on how it looks. Also, the result is much more professional looking. And you can define functions, e.g.,

Hello World, hello World !! - I say Hello to you, hello to you !! !

1.1 Some basics

Google “latex symbols”¹ for tables giving how to typeset interesting symbols, like this:

$$\varphi, \Xi, \partial, \leftrightarrow, \bigoplus$$

Consider $\varphi + \Xi^3$.

Top hit (and I’m having dinner with them on Friday):

<https://www.artofproblemsolving.com/wiki/index.php/LaTeX:Symbols>

This webpage explains a lot of math typesetting. Here’s some key things:

- Braces: $\{x : x \in \mathbb{Q}\}$
- Powers: x^{2+3} , $x^2 + 3$, $x^{(2+3)}$
- Subscripts: x_2, x_5, x_{2+3}
- Both: x_5^{2+3}
- A fraction: $\frac{2+3Hello10,hello10!!}{5}$
- An integral: $\int_0^{\pi+e^i} \sin(x)dx$
- A “displayed” integral:

$$\int_0^{\pi} \sin(x)dx$$

<http://detexify.kirelabs.org/classify.html>

1.2 Using Sage

Given any object `obj` in a Sage worksheet you can (try to) do `latex(obj)` to see how to typeset `obj`. You already learned about `sagetex`, which uses this under the hood, on Monday.

$$x + \frac{1}{6}x^3 + \left(-\frac{1}{40}\right)x^5 + \left(-\frac{55}{1008}\right)x^7 + \mathcal{O}(x^8)$$

$$\begin{pmatrix} 1 & -2 & \frac{1}{2} \\ 1 & 0 & 0 \\ -2 & 0 & 1 \end{pmatrix}$$

¹Look in the `tex` file for how I did those quotes and this footnote.

Exercise 1.1. Use Sage to find a latex formula for the first few terms of the Taylor series of $\tan(x)$ about zero.²

yourserieshere!

Exercise 1.2. Use Sage to Find a latex formula for a matrix using Sage. Use the command `matrix` to make a matrix.

yourmatrixhere!

1.3 Use Some random webpage

If you do a Google search for `latex formula editor` you'll find (many) kind-of-ugly websites with various programs that let you graphically construct an equation, which show you the latex code.

This is an unusual new demo, where they use machine learning to recognize handwriting (it is pretty impressive):

<http://webdemo.myscript.com/#/demo/equation>

$$\frac{\Omega + \alpha^3}{2}$$

2 Sectioning and cross referencing

This is Section 2. The next section is Section 3. You can reference anything, e.g., reminder 3 from Section .

Exercise 2.1. Try reordering the enumerate list above in some random way and or the sections (or adding new ones), then recompile and see all the cross reference numbers get updated.

3 Including graphics

You can take any pdf, png, or jpg file, put it in the same directory as your tex file (+New, drag and drop), and display them as follows:

²Hint: use `latex(\tan(x).series(x, 10))` in a worksheet, then copy/paste.



Hello , hello  !!

$$x^{\frac{1}{2}} + 1$$

Exercise 3.1. Upload and insert an image of your choice below. It must be png or pdf.

Sage can also produce pdf's of plots. E.g., if `g = plot(sin) + plot(cos)`, then `g.save('a.pdf')` will create a file `a.pdf` that you can include. This is a little more tedious than Sagetex, but you have more control.

Exercise 3.2. Create a plot and save it to a file as above in a Sage worksheet, then include it below: