This will be my awesome title.

An Intro to LaTeX

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1 Introduction

I think it's fair to say that most biologists switch from using word processors (like Microsoft Word or Apple Pages) to LaTeX when they start writing papers containing more than just one or two equations. I have to admit though, that after using both LaTeX and Pages for a few years (depending on the type of manuscript I was writing), I've now switched entirely to writing manuscripts in LaTeX (when collaborators allow). It took me a while to get the hang of it, but now I prefer it even when there are no equations involved.

Note that your LaTeX file is code that gets compiled. Also note that (almost) all the lecture notes for this class were written in LaTeX so take a look at a few of their `tex` files to learn a few additional tricks.

2 Basics

2.1 Document structure

What isn't visible here in this pdf document is that the code for every LaTeX document begins with a preamble that sets things up. In the preamble you define the type of document it is, load necessary packages, define any additional functions you might like to have, and provide your author name and the title of the paper. Your actual text is then written after beginning your document using `\begin{document}` and is followed at the very end by `\end{document}`.[1]

You "comment out" lines with the % symbol. Also, if you look at the raw `.tex` file behind this pdf, you'll notice that I wrote each sentence on its own line (i.e. with hard-returns between each). That's not necessary, but allows `Git` to distinguish changes on a sentence-specific rather than whole paragraph basis. A common alternative is to setup your editor such that all lines are limited to 72 or 80 characters.

2.2 Basic equations

In calculus, the definition of the derivative is

$$\lim_{\Delta t \to 0} \frac{f(a + \Delta t) - f(a)}{\Delta t} \,. \tag{1}$$

[1] Many other functions use the same begin ... end structure.

Although the typical way of writing a derivative is $\frac{dx}{dt}$, some fields also write it as $\dot{x}$.

2.3 Lists

Calculus rocks because it can be used to represent all of the following:

- first item
- second item

It also rocks because

1. first item
2. second item

2.4 Tables

One could also organize all the things calculus can be used for in a table:

Reason	Explanation
1	blah blah blah
2	blah blah blah

2.5 Within-text referencing

I can easily reference the section (sect.1), equation (eqn. 1) and table (Table 2.4). Their numbers will auto-generate, which makes it easy to move them around in your paper and adhere to a journal's stylistic preferences.

My un-numbered subsection

Sections and subsection are numbered by default, but that can be overwritten for a given section, or globally using `\setcounter{secnumdepth}{0}` in the preamble.

Figure 1: This is the LaTeX logo.

3 More equations

Using align

The Lotka-Voltera equations are given by

$$\frac{dx}{dt} = \alpha x - \beta xy \tag{2}$$

$$\frac{dy}{dt} = \gamma xy - \delta y\,. \tag{3}$$

Often it's useful to typeset the steps of derivations. Pay it forward to folks who are trying to learn these methods, and to yourself when you can't remember the details but have to lecture on it in 5 minutes. In these cases you don't need to number each line.

$$\begin{aligned} N(10) &= \lambda N(9) \\ &= \lambda^2 N(8) \\ &= \lambda^3 N(7) \\ &\cdots \\ &= \lambda^{10} N(0)\,. \end{aligned} \tag{4}$$

4 Inserting figures

Note that the position of figures is auto-determined (e.g., Fig. 1)! You can force the position of figures using the `float` package and then the [H] option for your figure (e.g., Fig. 2).

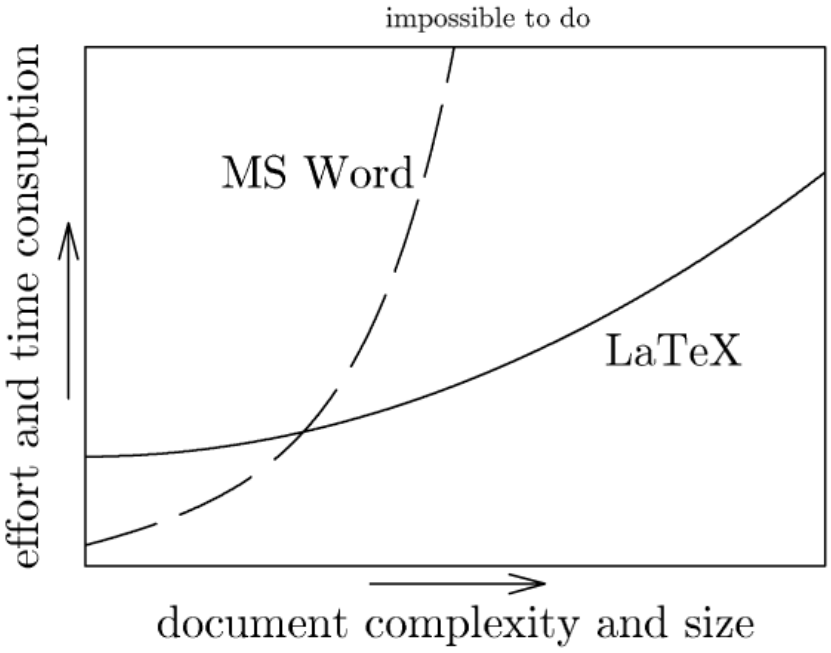

Figure 2: Why use LaTeX (source: http://www.pinteric.com/miktex.html)

5 Inserting external tables

It's relatively easy to use the R `Hmisc` package to generate LaTeX tables (see `../R/ExportTable.R`) and then import them into your document using `input`. Again, just like figures, their placement in the document is auto-determined. If you provided a caption to the tables when generating their tex files in R, it's easy to reference them (Table 1 and 2).

6 References

The `natbib` package is great for citing references. Reformatting for a different journal is as easy as changing the arguments of a function. How to cite references and include them in a bibliography is demonstrated in the accompanying `manuscript.tex` template in the parent folder of these lecture notes.

Table 1: The first six lines of my dataset.

x	y
0.443263064604253	4.28083287471942
0.892026401590556	5.13777481203160
0.509197412524372	3.67473555434176
0.967874688329175	5.37934574007462
0.810071667889133	4.94420398679803
0.485601465217769	3.81008116598662

Table 2: Estimated coefficients of a linear fit to the data.

Parameter	Estimate	Std. Error	t value	p-value
a	1.159	0.476	2.436	0.025
b	2.132	0.846	2.520	0.021

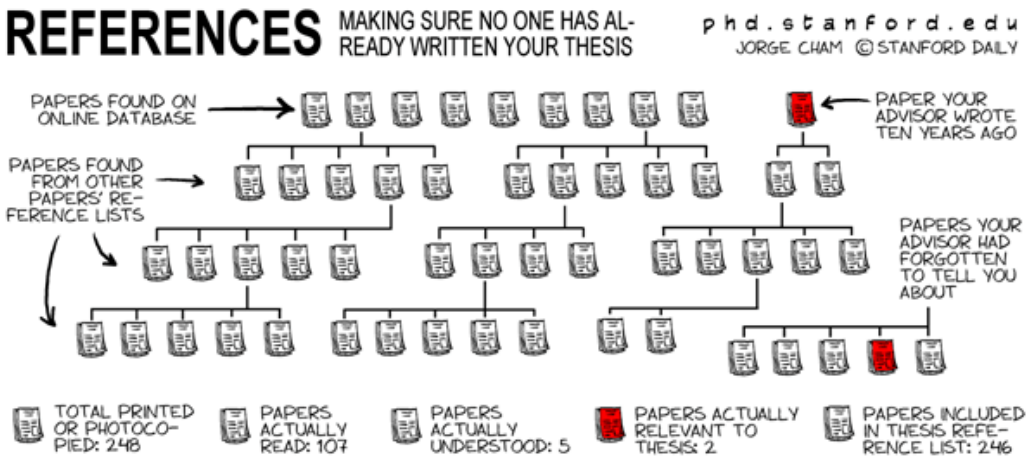

Figure 3: Reading is fundamental (source: http://phdcomics.com/comics/archive.php?comicid=286)