Computational Bootcamp 5: LaTeX, Markdown, and Formatting Documents for Social Science

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8/19/22

Installation: LaTeX

- Installing LaTeX can take a long time
- You do not need to install LaTeX to use Overleaf (although you will need to make an account on www.overleaf.com)
- My preferred way to install LaTeX, if you want it primarily for RMarkdown, is to install it through R (TinyTex package)
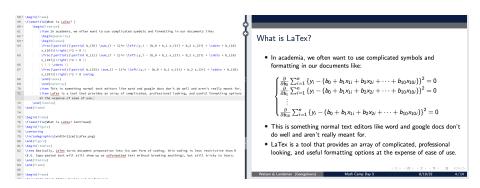
What is LaTex?

- In academia, we often want to use complicated symbols and formatting in our documents like:

$$\begin{cases} \frac{\partial}{\partial b_0} \sum_{i=1}^{n} \left\{ y_i - (b_0 + b_1 x_{1i} + b_2 x_{2i} + \cdots + b_{10} x_{10i}) \right\}^2 = 0 \\ \frac{\partial}{\partial b_1} \sum_{i=1}^{n} \left\{ y_i - (b_0 + b_1 x_{1i} + b_2 x_{2i} + \cdots + b_{10} x_{10i}) \right\}^2 = 0 \\ \quad \vdots \\ \frac{\partial}{\partial b_{10}} \sum_{i=1}^{n} \left\{ y_i - (b_0 + b_1 x_{1i} + b_2 x_{2i} + \cdots + b_{10} x_{10i}) \right\}^2 = 0 \end{cases}$$

- This is something normal text editors like word and google docs don't do well and aren't really meant for.

- LaTex is a tool that provides an array of complicated, professional looking, and useful formatting options at the expense of ease of use.
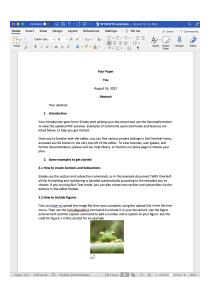
What is LaTex? Continued

The slide shown (right panel) reads:

What is LaTeX?

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$$\begin{cases} \frac{\partial}{\partial b_0} \sum_{i=1}^{n} \left\{y_i - (b_0 + b_1 x_{1i} + b_2 x_{2i} + \cdots + b_{10} x_{10i})\right\}^2 = 0 \\ \frac{\partial}{\partial b_1} \sum_{i=1}^{n} \left\{y_i - (b_0 + b_1 x_{1i} + b_2 x_{2i} + \cdots + b_{10} x_{10i})\right\}^2 = 0 \\ \vdots \\ \frac{\partial}{\partial b_{10}} \sum_{i=1}^{n} \left\{y_i - (b_0 + b_1 x_{1i} + b_2 x_{2i} + \cdots + b_{10} x_{10i})\right\}^2 = 0 \end{cases}$$

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- Basically, LaTex turns document preparation into its own form of coding, this coding is less restrictive than R (E.G. Copy-pasted text will still show up as unformatted text without breaking anything), but still tricky to learn.

Text Editor Design and Usefulness

- In general, there are two paradigms of text editing, WYSIWYG (what you see is what you get, often referred to as wizywig), and WYSIWYM (what you see if what you mean, often referred to as wizywim).

- In WYSIWYG editors, like Word, Google Docs, and PowerPoint, you write and format content at the same time.

- In WYSIWYM editors, formatting is done in a separate step (compiling, knitting, etc) with the aid of style commands and a stylesheet.

WYSIWYG

WYSIWYM

Quick Aside, Sending Word Files

- Whether you choose to use LaTex, Markdown, or neither, the goal should be to send .pdf files for final documents unless you are strictly required to send a word document.
- This is important for two reasons:
  1. .doc/.docx/Google Docs type files save meta-data (E.G: edit history) that can be embarassing.
  2. PDFs, particularly PDFs generated by Markdown and Latex, but also PDFs exported by Word, have a cleaner more professional look that will improve your confidence in submission and signal to whoever is reading your work that you know what you're doing.
- Share document files when you are collaborating with someone, share pdfs when they are evaluating your work. Where the line between the two is unclear, ask.
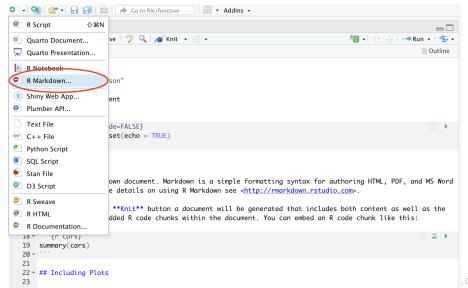
Markdown and RMarkdown

- Markdown trades some of LaTex's range of use for significant improvements in ease of use.
- RMarkdown combines Markdown with an r script editor that is almost as clear as the normal R script editor.
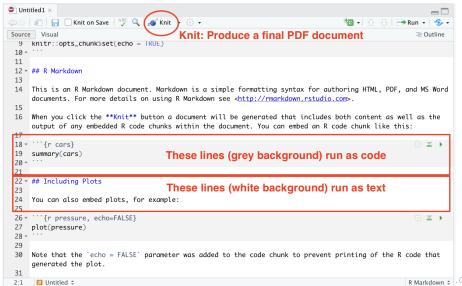
Installation: LaTeX (for R Markdown

```r
install.packages("rmarkdown")

library(rmarkdown)

install.packages("tinytex")

tinytex::install_tinytex()
```

RMarkdown

RMarkdown

For anyone who uses Pages

- For a 3x3 matrix $A = \begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix}$

  - Multiply a by the determinant of the 2x2 matrix that is not in a's row or column
  - Likewise for b and for c

- $|A| = a \begin{vmatrix} e & f \\ h & i \end{vmatrix} - b \begin{vmatrix} d & f \\ g & i \end{vmatrix} + c \begin{vmatrix} d & e \\ g & h \end{vmatrix}$

the determin

d order are

there are re
der and ran
other word
ight fail the
nverse/inve

$\begin{vmatrix} a & b \\ c & d \end{vmatrix}^{-1} =$

wap a and
r larger ma
perations to

- Swap

Edit Equation

```
|A| = a
\begin{vmatrix}
e & f \\
h & i \\
\end{vmatrix}
−b
\begin{vmatrix}
d & f \\
g & i \\
\end{vmatrix}
+c
\begin{vmatrix}
d & e \\
g & h \\
\end{vmatrix}
```

Problem Sets for GOVT 701

- Because RMarkdown allows you to include code in your writeup, with
  "'{r include = TRUE} it is great for projects where we are evaluating
  your coding skills like 701 problem sets.

- For those of you who are going on to 701 with some coding
  background. Writing problem sets in RMarkdown is a great way to
  make the class a little more challenging while preparing yourself for
  academic paper writing.

- Don't kill yourself trying to do this if you aren't there! Submitting a
  word document and r script for problem sets is also fine.