Markdown, LaTeX and Version Control

Welcome!

TA: Jennifer Lin

Math Camp 2022

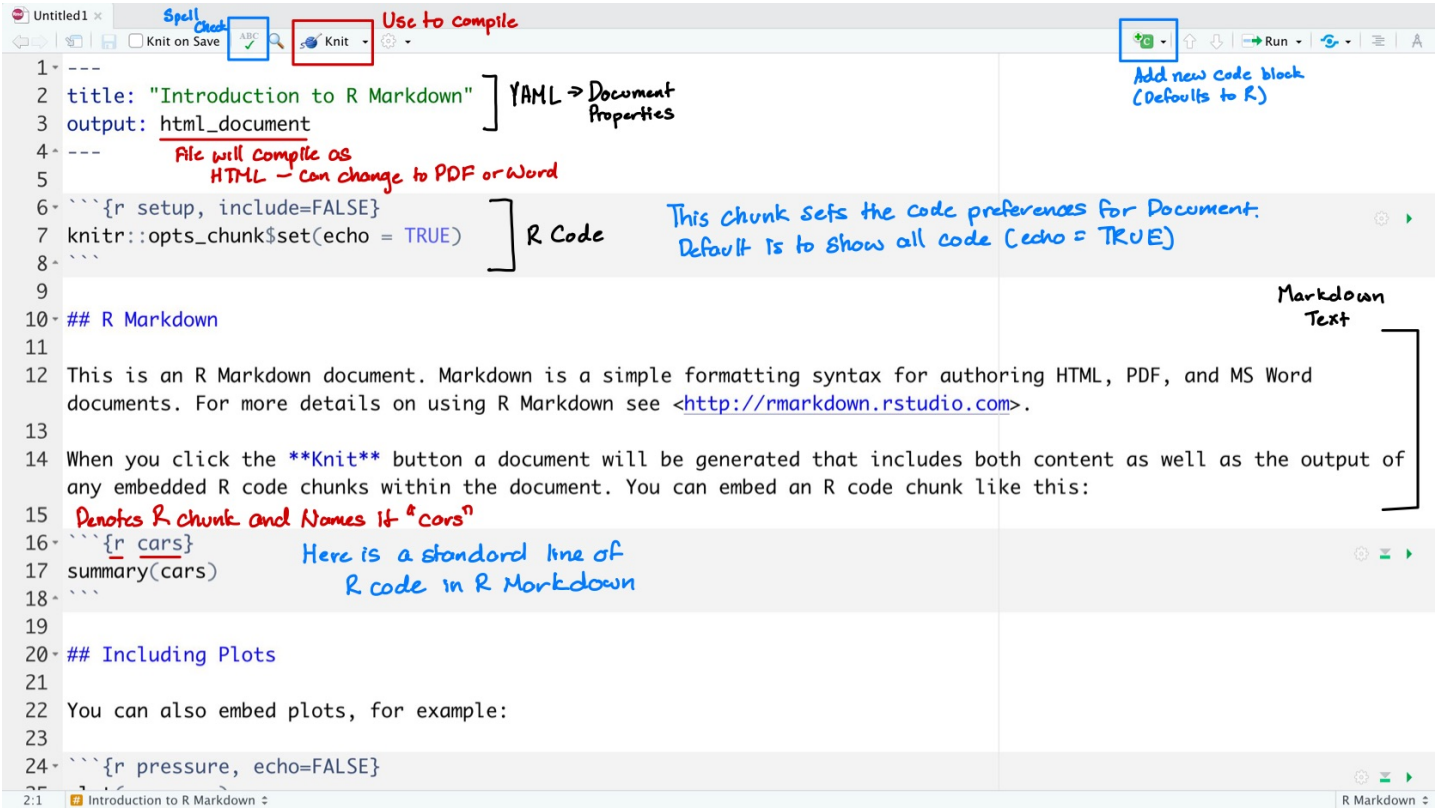
2022-09-06

Goals for Today

1. Become familiar with plain text software such as Markdown and LaTeX

2. Become familiar with version control software such as `git` and GitHub

Introduction to Markdown




```
---
title: "Introduction to R Markdown"
output: html_document
---

```{r setup, include=FALSE}
knitr::opts_chunk$set(echo = TRUE)
```

R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```{r cars}
summary(cars)
```

Including Plots

You can also embed plots, for example:

```{r pressure, echo=FALSE}
```
```

What is Markdown?

- Plain text -- text formats through markings rather than by clicking things on a toolbar
- Markup language -- Include markings next to text to denote what is bold, italic, and so on

Markdown Syntax

Headings

You can specify headings and subheadings in your document using the # before text that is meant to be a heading.

```
# Heading 1

## Heading 2

### Heading 3
```

Markdown Syntax

Bold, Italic, Code Text

You can **BOLD** text by inserting two asterisks before and after
`**text that should be bolded**`

You can *italicize* text by inserting one asterisk before and after
`*text that should be italicized*`

Markdown Syntax

Math Equations

We can also render math in markdown using LaTeX syntax. Inline math equations need to be enclosed in dollar signs such that $ax^2 + bx + c = 0$ is typed as `$ax^2 + bx + c = 0$` and

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

as

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

Oh and back ticks give us verbatim text.

R Markdown

- Serves as a place to write R code and description text
- Can be rendered as a PDF, HTML or Word document (You will need LaTeX installed to do PDF compiles)
- Compiles with "Knit" button on top of screen -- Careful! This runs all of the code that you write each time!

R Markdown Code Chunks

- Runs R code like the R Scripts

````
```{r, warning=FALSE, message=FALSE}
library(dplyr)
library(ggplot2)
library(tidyr)
```
````

- Code must be in the grey chunks and can be shown or hidden
  - `echo = TRUE` shows and evaluates code
  - `eval = TRUE` evaluates code, FALSE does not
  - `include = TRUE` includes the code in the output
  - `warning = FALSE` suppresses warnings
  - `message = FALSE` suppresses messages

Introduction to LaTeX

Truths of Life

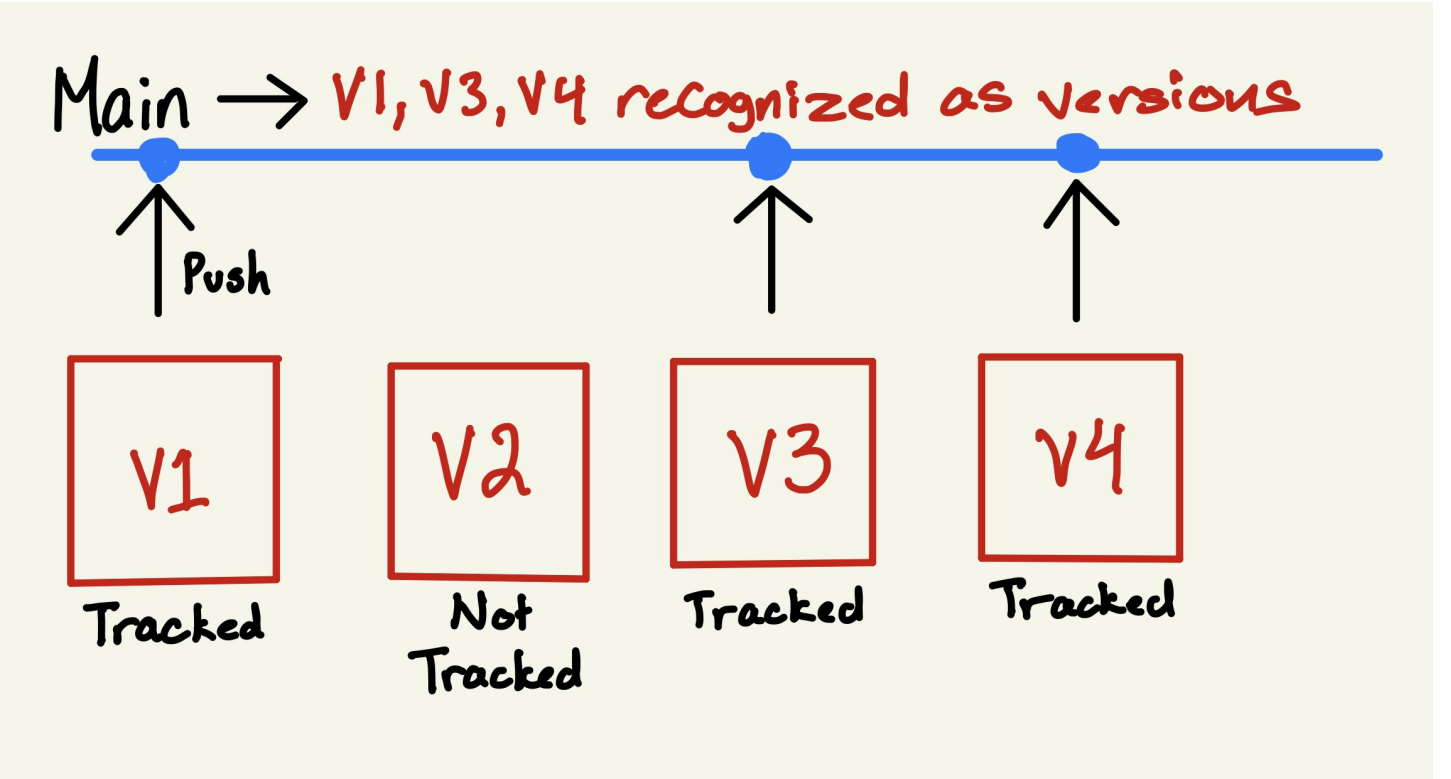
1. Patience is a Virtue
2. Pay Attention to Detail
3. If there is a beginning, there must be an end

LaTeX in Practice

Let's go to Overleaf!

(And Reference the LaTeX guide)

Introduction to `git` and GitHub



GitHub in Practice

Let's go to GitHub!

(And Reference the GitHub guide)

Exercises

The goal of this exercise is to get you familiar with typing math. So to make it easier, I have given you a blank document to work with. The first section deals with LaTeX and the second with R Markdown. The LaTeX section is more math focused and the R section is about displaying R code. Both exercises are also in the notes so reference those if you work faster than your peers.

Remember, include all the bold, italics and other formatting as it appears

To Submit: Create a branch on the Math Camp Practice GitHub and push both the R Markdown and the LaTeX work to your branch. Include both the PDF and the raw code.

Replicate the following paragraph in a LaTeX document

These are some of the most beautiful math equations according to the Internet. Let's start *nice and easy*:

$$\int_a^b f(x)dx = F(b) - F(a)$$

Now, let's try something a bit more challenging. Here is the **Explicit Formula for the Fibonacci Sequence**.

$$F(n) = \frac{(\varphi)^n - (-\frac{1}{\varphi})^n}{\sqrt{5}}$$

Not enough? How about the *Euler Product Formula*:

$$\sum_n \frac{1}{n^S} = \prod_p \frac{1}{1 - \frac{1}{p^S}}$$

Replicate the following paragraph in R Markdown

Now to R. See the R Markdown document for your exercise.