Homework tips with R Markdown

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This document contains helpful LaTeX settings for doing simple homework assignments. It is written with an R Markdown source file (`.Rmd`) and compiled to PDF.

Here is a quick overview of its features.

- All `.Rmd` documents begin with a header that is written with YAML. It is like a LaTeX preamble, if you're familiar with that idea. This block defines global document parameters like the title, author, and (in our case) global LaTeX options.
- This header has commented code in it (beginning with `#`) to explain some common, useful options.

This particular document includes LaTeX-specific stuff, so let's talk about that in particular.

- The `parskip` package sets the paragraph style to be non-intended with blank lines between each paragraph.
- The `amsmath` package contains common math tools, including the `{align}` environment for nice multi-line equations. (Better than `{eqnarray}`!)
- You can define your own macros in LaTeX, just like you can write your own functions in other programming languages. I've written some that make it easier to write easier probability theory notation.
- I have included the `mathptmx` package to demonstrate other the fonts available to LaTeX.

Here is a demonstration of the custom macros for expectations, variance, and covariance.

- Expectations: $\mathbb{E}[X]$
- Conditional expectation: $\mathbb{E}[Y \mid X]$ (use `\mid` for the vertical pipe)
- Variance and covariance: $\text{Var}(X)$, $\text{Cov}(X, Y)$, $\text{Cor}(X, Y)$

Use the `{align}` environment to align multi-line equations along the `=` symbol (or any arbitrary symbol). Alignment is controlled by the `&` token in the source code.

$$y = 3 \tag{1}$$

$$y \neq 4 \tag{2}$$

An equation for a sample mean, to demonstrate how to achieve other common math notation:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^{n} x_i$$

Note that this equation is not numbered. You can suppress equation numbering using `{align*}` with an asterisk.