

# CS&SS 569 Visualizing Data and Models

## Lab 2: Intro to $\text{\LaTeX}$ with R Markdown and Overleaf

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# Agenda

1. R Markdown and HW1
2.  $\text{\LaTeX}$  and Overleaf

# Homework Submission

- ▶ **Use Canvas** not email

## R Markdown and HW1

- ▶ Problem 1: Attach files (PDF/picture), and offer your critique and remedy
- ▶ Problem 2: Read data and reproduce the plot
  - ▶ *Do not spend more than two hours*

# R Markdown

- ▶ R Markdown file (.Rmd) offers an integrated framework
  - ▶ To contain both narrative text, code chunks and outputs such as graphs
  - ▶ To render (“knit”) high quality, reproducible outputs
    - ▶ HTML, PDF, Word, Beamer, etc.
    - ▶ I write my slides using R Markdown (in Beamer: a  $\text{\LaTeX}$  class of presentation slides)
    - ▶ Great way to submit your homework
  - ▶  $\text{\LaTeX}$  code is supported

## R-Markdown

- ▶ If any of you is looking for an general introduction for RMarkdown, I suggest you to check [Chapter 27](#) from Wickham and Grolemund (2017) - **R for Data Science**.
- ▶ If you want a more comprehensive guide, then check Xie et al. (2021) - **R Markdown: The Definitive Guide**.
- ▶ Another, more applied, resource is Xie et al. (2022) - **R Markdown Cookbook**.

## R-Markdown

- ▶ RMarkdown is a document format that allows you to integrate R **code** and **output** into a single document.
- ▶ Besides R code and output, it can also include **text**, **images**, and other **multimedia elements**, allowing for rich and informative documents.
- ▶ *Pandoc* is a free and open-source **document converter** that can convert documents from one markup language to another.
  - ▶ In the context of Rmarkdown, pandoc is the underlying document converter (software) that converts the R-markdown file into a final output format, such as **HTML**, **PDF**, or **Word**.

## R-Markdown

- ▶ The output format of the final document can be customized using options in the **YAML header** or external templates.

```
1  ---
2  title: "Lab 1 - Intro to RMarkdown"
3  author: "Your name"
4  date: \today
5  output:
6    pdf_document:
7      latex_engine: pdflatex
8  fontsize: 12pt
9  editor_options:
10   chunk_output_type: console
11  ---
12
```

- ▶ The YAML header in RMarkdown is a block of configuration settings at the beginning of the document enclosed by three hyphens (---).
- ▶ It is used to specify document metadata and other settings such as the document title, author, output format, and more.



## R-Markdown

- ▶ **Code chunks** are sections of R code that can be executed and embedded within an RMarkdown document.


```
78
79 {r name, error=TRUE, warning=FALSE}
80 # brau brau, derp herp
81 head(data)
82
83
```

- ▶ Code chunks can be inserted using the syntax `{r}` and closed with `"`.
  - ▶ Short cut in Windows: `Ctrl + Alt + I`
  - ▶ Short cut in macOS: `Cmd + Option + I`
- ▶ Code chunks can be customized with various **chunk options**.

# R-Markdown

- ▶ **Note:** set the function `knitr::opts_chunk$set()` with any general setting without repeating it in every code chunk.
- ▶ Recommendation chunk options for Homework

```
1 ---
2 title: "RMarkdown sample"
3 author: "Your name"
4 date: "2024-01-10"
5 output: pdf_document
6 ---
7
8 ```{r setup, include=FALSE}
9 # This first chunk is generally hidden and used to load data, libraries
10 and the stuff that you do not need to show in the report.
11 knitr::opts_chunk$set(echo = TRUE,
12                       error = FALSE,
13                       message = FALSE,
14                       warning = FALSE)
15
16 # load libraries
17
18 library("tidyverse")
19
```



## R-Markdown

- ▶ In RMarkdown, **rendering** a document means converting the source RMarkdown file into its final output format (using pandoc).
- ▶ To render a document, we need to `Knit`, knitting is the process of taking the RMarkdown file and converting it into a single, cohesive document that can be rendered into different formats (HTML, PDF, etc).
- ▶ To compile a R Markdown document to PDF, you need to install  $\text{\LaTeX}$ 
  - ▶ If you haven't installed any previous  $\text{\LaTeX}$  distribution, I recommend TinyTeX

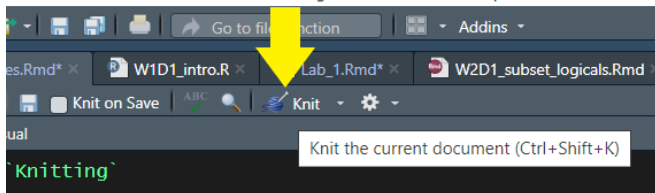
## R Markdown and TinyTeX

- ▶ “TinyTeX is a lightweight, portable, cross-platform, and easy-to-maintain LaTeX distribution”:

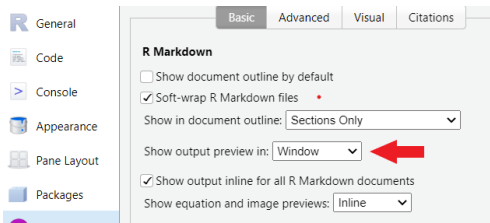
```
install.packages('tinytex')  
tinytex::install_tinytex()
```

# Knitting

- ▶ To knit:



- ▶ Auxiliary window for output preview:



## R Markdown in practices: two examples

- ▶ `lab2_RMarkdownSample.Rmd`: cover most of the basic functionalities in R Markdown; good for future reference
- ▶ `CSS569HW1Start.Rmd`: a template to get started with HW 1!

# Intro to $\text{\LaTeX}$ with Overleaf

- ▶ Alternatively, we have Overleaf: <https://www.overleaf.com/>
  - ▶ An online  $\text{\LaTeX}$  editor
    - ▶ Integrated PDF preview panel
    - ▶ Quality of life features: auto-complete commands, auto-close brackets, keyboard shortcuts, etc.
    - ▶ Numerous templates: journal articles, books, CVs, slides, posters, etc.
    - ▶ Easy collaboration (But not free)
    - ▶ Integrated with Zotero and Mendeley for bibliography management
    - ▶ Integrated with Git for version control

# Intro to $\LaTeX$ with Overleaf

- ▶ Before we dive in, useful resources.
  - ▶ [The Not So Short Introduction to  \$\LaTeX 2\_{\epsilon}\$](#)  (Oetiker et al., 2023).
    - ▶ Learn  $\LaTeX$  in 280 pages / minutes.
  - ▶ [Overleaf documentation](#).
    - ▶ Contains intro to basic  $\LaTeX$ , Overleaf, and many practical guides.
  - ▶ [TeXat StackExchange](#).
  - ▶ General: [Mathematics](#) and [Tables](#) and [TikZ](#).
  - ▶ Beamer Theme: [here](#).
  - ▶ Bibliography: [natbib](#), [doi2bib](#), [text2bib](#)
  - ▶ Other: [here](#).



# Intro to $\text{\LaTeX}$ with Overleaf

- ▶ Some useful templates:
  - ▶ Thesis: [here](#).
  - ▶ Homework: my sample with appendix for R code [here](#), another [here](#).
  - ▶ Working paper: [Kenya's sample](#) and [Chris's sample](#) (*not for beginners*).
  - ▶ Academic journal: [here](#).
  - ▶ Presentation slides (Beamer): [here](#).
  - ▶ Poster presentations: [here](#)
  - ▶ CVs and résumés: [here](#).
  - ▶ Graphs, trees, diagrams (TikZ): tutorial [here](#) and gallery [here](#).

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