CS&SS 569 Visualizing Data and Models
Lab 2: Intro to \LaTeX\ with R Markdown and Overleaf

Brian Leung

Department of Political Science, UW

2023-01-11
Agenda

1. Logistics
Agenda

1. Logistics

2. R Markdown and HW1
Agenda

1. Logistics

2. R Markdown and HW1

3. \LaTeX{} and Overleaf
Homework Submission

- Use Canvas not email
Problem 1: Attach files (PDF/picture), and offer your critique and remedy
R Markdown and HW1

- Problem 1: Attach files (PDF/picture), and offer your critique and remedy
- Problem 2: Read data and reproduce the plot
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
R Markdown

- R Markdown file (.Rmd) offers an integrated framework
  - To contain both narrative text, code chunks and outputs such as graphs
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
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.
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 \LaTeX\ class of presentation slides)
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 \LaTeX\ class of presentation slides)
  - Great way to submit your homework
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 \LaTeX{} class of presentation slides)
    - Great way to submit your homework
  - \LaTeX{} code is supported
R Markdown and TinyTeX

To compile an R Markdown document to PDF, you need to install \LaTeX.
R Markdown and TinyTeX

To compile an R Markdown document to PDF, you need to install \LaTeX.

- If you haven’t installed any previous \LaTeX distribution, I recommend TinyTeX
R Markdown and TinyTeX

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

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


Intro to \TeX{} and \LaTeX{}

\TeX{} is a typesetting engine\footnote{Modern extensions of the \TeX{} engines include pdfTeX, XeTeX, LuaTeX, etc.} designed by Donald Knuth, a computer scientist and mathematician at Stanford.
Intro to \TeX{} and \LaTeX{}

\TeX{} is a *typesetting engine*\(^1\) designed by Donald Knuth, a computer scientist and mathematician at Stanford

- For typesetting scientific text and mathematical formulas

\(^1\)Modern extensions of the \TeX{} engines include pdf\TeX{}, Xe\TeX{}, Lua\TeX{}, etc.
Intro to \TeX{} and \LaTeX{}

- \LaTeX{} is a document preparation system, or a macro package, built on top of the \TeX{} engine, with features:
Intro to \TeX{} and \LaTeX{}

- \LaTeX{} is a *document preparation system, or a macro package*, built on top of the \TeX{} engine, with features:
  - Typesetting journal articles, technical reports, books, and slides

See more here
Intro to \TeX\ and \LaTeX

\LaTeX\ is a *document preparation system, or a macro package*, built on top of the \TeX\ engine, with features:

- Typesetting journal articles, technical reports, books, and slides
- Control over large documents containing sectioning, cross-references, tables and figures
Intro to \TeX{} and \LaTeX{}

\LaTeX{} is a *document preparation system, or a macro package*, built on top of the \TeX{} engine, with features:

- Typesetting journal articles, technical reports, books, and slides
- Control over large documents containing sectioning, cross-references, tables and figures
- Typesetting of complex mathematical formulas

See more here
Intro to \TeX{} and \LaTeX{}

\LaTeX{} is a \textit{document preparation system, or a macro package}, built on top of the \TeX{} engine, with features:

\begin{itemize}
  \item Typesetting journal articles, technical reports, books, and slides
  \item Control over large documents containing sectioning, cross-references, tables and figures
  \item Typesetting of complex mathematical formulas
  \item Advanced typesetting of mathematics with AMS-\LaTeX{}
\end{itemize}
Intro to \TeX\ and \LaTeX

\LaTeX\ is a document preparation system, or a macro package, built on top of the \TeX\ engine, with features:
\begin{itemize}
  \item Typesetting journal articles, technical reports, books, and slides
  \item Control over large documents containing sectioning, cross-references, tables and figures
  \item Typesetting of complex mathematical formulas
  \item Advanced typesetting of mathematics with AMS-\LaTeX
  \item Automatic generation of bibliographies and indexes
\end{itemize}
\textsc{LaTeX} is a \textit{document preparation system, or a macro package}, built on top of the \TeX{} engine, with features:

- Typesetting journal articles, technical reports, books, and slides
- Control over large documents containing sectioning, cross-references, tables and figures
- Typesetting of complex mathematical formulas
- Advanced typesetting of mathematics with AMS-\LaTeX{}
- Automatic generation of bibliographies and indexes
- Multi-lingual typesetting
Intro to \TeX and \LaTeX

\LaTeX is a *document preparation system, or a macro package*, built on top of the \TeX engine, with features:

- Typesetting journal articles, technical reports, books, and slides
- Control over large documents containing sectioning, cross-references, tables and figures
- Typesetting of complex mathematical formulas
- Advanced typesetting of mathematics with AMS-\LaTeX
- Automatic generation of bibliographies and indexes
- Multi-lingual typesetting
- See more [here](#)
Intro to \TeX\textsuperscript{\textregistered} and \LaTeX\textsuperscript{\textregistered}

- Popular implementations, or distributions, of \TeX/\LaTeX
Intro to \TeX{} and \LaTeX{}

- Popular *implementations, or distributions*, of \TeX{}/\LaTeX{}
  - MacTeX for Mac OS: http://www.tug.org/mactex/
Intro to \TeX\ and \LaTeX

- Popular *implementations, or distributions*, of \TeX/\LaTeX
  - MacTeX for Mac OS: http://www.tug.org/mactex/
  - MiKTeX for Windows: https://miktex.org
Intro to \TeX{} and \LaTeX{}

- \LaTeX{} vs. other word processors (e.g. Microsoft Word)
Intro to TEX and \LaTeX

- \LaTeX vs. other word processors (e.g. Microsoft Word)
  - Microsoft Word/Power Point
Intro to \TeX\ and \LaTeX

- \LaTeX vs. other word processors (e.g. Microsoft Word)
  - Microsoft Word/Power Point
Intro to \TeX\ and \LaTeX\

\begin{itemize}
  \item \LaTeX\ vs. other word processors (e.g. Microsoft Word)
    \begin{itemize}
      \item Microsoft Word/Power Point
        \begin{itemize}
          \item WYSIWYG: What You See Is What You Get
          \item You interact with a user interface to control the document layout while typing text
        \end{itemize}
    \end{itemize}
\end{itemize}
Intro to \TeX{} and \LaTeX{}

- \LaTeX{} vs. other word processors (e.g. Microsoft Word)
  - Microsoft Word/Power Point
    - You interact with a user interface to control the document layout while typing text
    - What is displayed on the screen resembles what will be printed
Intro to \TeX\ and \LaTeX

\begin{itemize}
\item \LaTeX\ vs. other word processors (e.g. Microsoft Word)
  \begin{itemize}
  \item Microsoft Word/Power Point
    \begin{itemize}
    \item WYSIWYG: What You See Is What You Get
    \item You interact with a user interface to control the document layout while typing text
    \item What is displayed on the screen resembles what will be printed
    \end{itemize}
  \end{itemize}
\item \LaTeX
\end{itemize}
Intro to \TeX\ and \LaTeX

- \LaTeX\ vs. other word processors (e.g. Microsoft Word)
  - Microsoft Word/Power Point
    - You interact with a user interface to control the document layout while typing text
    - What is displayed on the screen resembles what will be printed
  - \LaTeX
    - You provide “\LaTeX\ commands” to specify the layout, structure, and details of the document:
Intro to \TeX{} and \LaTeX{}

- \LaTeX{} vs. other word processors (e.g. Microsoft Word)
  - Microsoft Word/Power Point
    - You interact with a user interface to control the document layout while typing text
    - What is displayed on the screen resembles what will be printed
  - \LaTeX{}
    - You provide "\LaTeX{} commands" to specify the layout, structure, and details of the document:
      - $\texttt{\backslash command[optional parameter]}\{parameter\}$
Intro to \TeX and \LaTeX

- \LaTeX vs. other word processors (e.g. Microsoft Word)
  - Microsoft Word/Power Point
    - You interact with a user interface to control the document layout while typing text
    - What is displayed on the screen resembles what will be printed
  - \LaTeX
    - You provide \texttt{\LaTeX} commands to specify the layout, structure, and details of the document:
      - \texttt{\LaTeX\ command[optional parameter]\{parameter\}}
      - And \texttt{typeset} the document using the \TeX engine and compile the output
Intro to \TeX{} and \LaTeX{}

- The input for \LaTeX{} is a plain text file (.tex)
The input for \LaTeX is a plain text file (.tex)

- You need a text editor!

Numerous popular text editors:

- Specific: Texmaker, TeXShop, TeXstudio, TeXworks...
- Generic: Emacs (Aquamacs), Vim, Sublime, Atom...
Intro to \TeX{} and \LaTeX{}

- The input for \LaTeX{} is a plain text file (.tex)
  - You need a text editor!
- Numerous popular text editors
The input for \LaTeX is a plain text file (.tex)
- You need a text editor!
- Numerous popular text editors
  - Specific: Texmaker, TeXShop, TeXstudio, TeXworks...
Intro to $\text{T\kern-.1667em E\kern-.125em X}$ and $\text{L\kern-.1667em A\kern-.125em T\kern-.1667em E\kern-.125em X}$

- The input for $\text{L\kern-.1667em A\kern-.125em T\kern-.125em E\kern-.125em X}$ is a plain text file (.tex)
  - You need a text editor!
- Numerous popular text editors
  - Specific: Texmaker, TeXShop, TeXstudio, TeXworks…
  - Generic: Emacs (Aquamacs), Vim, Sublime, Atom…
Intro to \LaTeX\ with Overleaf

- All the above sound pretty complicated...
Intro to \LaTeX{} with Overleaf

- All the above sound pretty complicated...
- Overleaf: https://www.overleaf.com/
Intro to \LaTeX\ with Overleaf

- All the above sound pretty complicated...
- Overleaf: [https://www.overleaf.com/](https://www.overleaf.com/)
  - An online \LaTeX\ editor
Intro to LaTeX with Overleaf

▶ All the above sound pretty complicated...
▶ Overleaf: https://www.overleaf.com/
  ▶ An online LaTeX editor
    ▶ Integrated PDF preview pane
Intro to \LaTeX\ with Overleaf

- All the above sound pretty complicated...
- Overleaf: [https://www.overleaf.com/](https://www.overleaf.com/)
  - An online \LaTeX\ editor
    - Integrated PDF preview pane
    - Quality of life features: auto-complete commands, auto-close brackets, keyboard shortcuts, etc.
Intro to $\LaTeX$ with Overleaf

- All the above sound pretty complicated...
- Overleaf: [https://www.overleaf.com/](https://www.overleaf.com/)
  - An online $\LaTeX$ editor
    - Integrated PDF preview pane
    - Quality of life features: auto-complete commands, auto-close brackets, keyboard shortcuts, etc.
    - Numerous templates: journal articles, books, CVs, slides, posters, etc.
Intro to *\LaTeX* with Overleaf

▶ All the above sound pretty complicated...
▶ **Overleaf**: [https://www.overleaf.com/](https://www.overleaf.com/)
  ▶ An online \LaTeX{} editor
    ▶ Integrated PDF preview pane
    ▶ 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)
Intro to \LaTeX{} with Overleaf

▷ All the above sound pretty complicated...
▷ Overleaf: https://www.overleaf.com/
  ▷ An online \LaTeX{} editor
    ▷ Integrated PDF preview pane
    ▷ 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
Intro to \LaTeX\ with Overleaf

- All the above sound pretty complicated...
- Overleaf: https://www.overleaf.com/
  - An online \LaTeX\ editor
    - Integrated PDF preview pane
    - 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
Intro to \LaTeX\ with Overleaf

Before we dive in, useful resources

- The Not So Short Introduction to \LaTeX\ 2ε (Oetiker et al., 2018)
Before we dive in, useful resources

- The Not So Short Introduction to \LaTeX{} 2ε (Oetiker et al., 2018)
- Learn \LaTeX{} in 139 pages / minutes
Intro to $\LaTeX$ with Overleaf

- Before we dive in, useful resources
  - The Not So Short Introduction to $\LaTeX\ 2\epsilon$ (Oetiker et al., 2018)
    - Learn $\LaTeX$ in 139 pages / minutes
  - ‘Overleaf’ documentation
Intro to \LaTeX\ with Overleaf

Before we dive in, useful resources

- The Not So Short Introduction to \LaTeX\ 2ε (Oetiker et al., 2018)
  - Learn \LaTeX\ in 139 pages / minutes
- ‘Overleaf’ documentation
  - Contains intro to basic \LaTeX, Overleaf, and many practical guides
Intro to $\LaTeX$ with Overleaf

- Before we dive in, useful resources
  - The Not So Short Introduction to $\LaTeX$ 2ε (Oetiker et al., 2018)
    - Learn $\LaTeX$ in 139 pages / minutes
  - ‘Overleaf’ documentation
    - Contains intro to basic $\LaTeX$, Overleaf, and many practical guides
  - $\TeX$ at StackExchange
Intro to \LaTeX{} with Overleaf

- Before we dive in, useful resources
  - The Not So Short Introduction to \LaTeX{} 2\varepsilon{} (Oetiker et al., 2018)
    - Learn \LaTeX{} in 139 pages / minutes
  - 'Overleaf' documentation
    - Contains intro to basic \LaTeX{}, Overleaf, and many practical guides
  - \TeX{} at StackExchange
  - General: Mathematics and Tables and TikZ
Intro to \LaTeX{} with Overleaf

- Before we dive in, useful resources
  - The Not So Short Introduction to \LaTeX{} 2ε (Oetiker et al., 2018)
    - Learn \LaTeX{} in 139 pages / minutes
  - ‘Overleaf’ documentation
    - Contains intro to basic \LaTeX{}, Overleaf, and many practical guides
  - \TeX{} at StackExchange
  - General: Mathematics and Tables and TikZ
  - Beamer Theme: here
Intro to \LaTeX{} with Overleaf

- Before we dive in, useful resources
  - The Not So Short Introduction to \LaTeX{} 2ε (Oetiker et al., 2018)
    - Learn \LaTeX{} in 139 pages / minutes
  - ‘Overleaf’ documentation
    - Contains intro to basic \LaTeX{}, Overleaf, and many practical guides
  - \TeX{} at StackExchange
  - General: Mathematics and Tables and TikZ
  - Beamer Theme: here
  - Bibliography: natbib, doi2bib, text2bib
Intro to \LaTeX\ with Overleaf

- Before we dive in, useful resources
  - The Not So Short Introduction to \LaTeX\2ε (Oetiker et al., 2018)
    - Learn \LaTeX\ in 139 pages / minutes
  - 'Overleaf' documentation
    - Contains intro to basic \LaTeX, Overleaf, and many practical guides
  - \TeX\ at StackExchange
  - General: Mathematics and Tables and TikZ
  - Beamer Theme: here
  - Bibliography: natbib, doi2bib, text2bib
  - Other: here
Intro to \LaTeX\ with Overleaf

- Some useful templates:
Intro to \LaTeX\ with Overleaf

- Some useful templates:
  - Thesis: [here](#)
  - Working paper: My sample, and Chris's sample
  - Academic journal: [here](#)
  - Presentation slides (Beamer): [here](#) and [here](#)
  - Poster: [here](#)
  - CV: [here](#) and [here](#)
  - Graphs, trees, diagrams (TikZ): [here](#) and [here](#)
Intro to \textsc{LaTeX} with Overleaf

- Some useful templates:
  - Thesis: [here]
  - Working paper: My sample, and Chris’s sample

- Academic journal: [here]
- Presentation slides (Beamer): [here] and [here]
- Poster: [here]
- CV: [here] and [here]
- Graphs, trees, diagrams (TikZ): [here] and [here]
Intro to \LaTeX{} with Overleaf

- Some useful templates:
  - Thesis: [here](#)
  - Working paper: My sample, and Chris’s sample
  - Academic journal: [here](#)

- Presentation slides (Beamer): [here](#) and [here](#)
- Poster: [here](#)
- CV: [here](#) and [here](#)
- Graphs, trees, diagrams (TikZ): [here](#) and [here](#)
Intro to \LaTeX{} with Overleaf

- Some useful templates:
  - Thesis: [here](#)
  - Working paper: [My sample](#), and [Chris’s sample](#)
  - Academic journal: [here](#)
  - Presentation slides (Beamer): [here](#) and [here](#)

- [Graphs, trees, diagrams (TikZ)](#)
Intro to $\LaTeX$ with Overleaf

- Some useful templates:
  - Thesis: [here](#)
  - Working paper: [My sample](#) and [Chris’s sample](#)
  - Academic journal: [here](#)
  - Presentation slides (Beamer): [here](#) and [here](#)
  - Poster: [here](#)
Intro to \LaTeX with Overleaf

- Some useful templates:
  - Thesis: [here](#)
  - Working paper: My sample, and Chris’s sample
  - Academic journal: [here](#)
  - Presentation slides (Beamer): [here](#) and [here](#)
  - Poster: [here](#)
  - CV: [here](#) and [here](#)
Intro to \LaTeX{} with Overleaf

Some useful templates:

- Thesis: [here](#)
- Working paper: My sample, and Chris’s sample
- Academic journal: [here](#)
- Presentation slides (Beamer): [here](#) and [here](#)
- Poster: [here](#)
- CV: [here](#) and [here](#)
- Graphs, trees, diagrams (TikZ): [here](#) and [here](#)