Math Mode Revisited
000000

Creating Bibliographies
000000000000

Exporting from statistical software to LaTeX
0000

Knitr/Sweave
00

Applied LaTeX for Researchers

Daniel Sánchez Pazmiño, MA

Laboratorio de Investigación para el Desarrollo del Ecuador

February 2025

Math Mode Revisited
●○○○○○

Creating Bibliographies
○○○○○○○○○○○○○

Exporting from statistical software to LATEX
○○○○

Knitr/Sweave
○○

Math Mode Revisited

Math Mode Revisited

- Math mode is arguably LATEX's most powerful feature

    - However, its syntax often takes some time to master

- Fortunately, tools have been developed to help users write LATEX code more easily

- In this section, we will explore some of these tools

Math Mode Revisited
○○●○○○

Creating Bibliographies
○○○○○○○○○○○○

Exporting from statistical software to LATEX
○○○○

Knitr/Sweave
○○

Using AI

- Never ignore AI in your workflows
    - AI will not replace you, someone who knows how to use it will
- ChatGPT can help you with any sort of text generation or syntax question
    - Ask it to generate an equation in LATEX for you
    - Alternatively, you may feed it a picture of an equation and ask it to generate the LATEX code for you
- Writefull AI is Overleaf's own AI assistant
    - Cheaper than ChatGPT, but still not free
- Check out There's an AI for That for more AI tools
    - A quick search yields several other tools, such as LaText AI.

Codecogs

- Codecogs is a free online LaTeX equation editor

- Following a more "click and drag" approach, it is a good tool for beginners

  - Much like Overleaf's equation editor, you can click on symbols to add them to your equation
  - It also has a "Copy to Clipboard" button, which makes it easy to paste the equation into your document

Math Mode Revisited
○○○○●○

Creating Bibliographies
○○○○○○○○○○○○

Exporting from statistical software to LATEX
○○○○

Knitr/Sweave
○○

Mathpix

- Mathpix is one of the best tools for converting images of equations into LATEX code

- Available as a desktop app, you can take a screenshot of an equation and Mathpix will convert it into LATEX code

  - It also has a mobile app, which is useful for taking pictures of equations in textbooks

- Without spending any money, it will allow you to convert a limited number of equations per month

  - However, the paid version is not expensive

Word Equations

- If for any reason you need to write a Word document with complex equations, you can actually write the equations in LATEX and then convert them to Word format

- This will require you to turn on the "LaTeX" option in the Equation tab, rather than the "Unicode" option.

Creating Bibliographies

Math Mode Revisited
000000

Creating Bibliographies
0●0000000000

Exporting from statistical software to LaTeX
0000

Knitr/Sweave
00

Creating Bibliographies

- The bibliography or reference list is a crucial part of any academic paper.

- In LaTeX, you can create a bibliography using several different packages

    - natbib, biblatex, and apacite are some of the most popular
    - Each package has its own syntax and features

- In this section, we will focus on biblatex, which is the most modern and flexible of the three

    - The workflow is similar to referencing in Quarto/RMarkdown

Where to store your bibliography

- You can create a bibliography in LATEXon your own, but it is much easier to use a reference manager
    - Zotero, Mendeley, and EndNote are some of the most popular reference managers
- Zotero is free and open-source, and it has a plugin for Word and LibreOffice
    - It also has a plugin for Google Docs, which is useful for collaborative writing
    - Here, we will focus on Zotero
- You can add references to Zotero using the Chrome add-on, or by manually entering them

Math Mode Revisited
oooooo

Creating Bibliographies
ooo●ooooooooo

Exporting from statistical software to LaTeX
oooo

Knitr/Sweave
oo

Loading the package into LaTeX

- To use `biblatex`, you need to load the package in the preamble of your document
    - You also need to specify the style of the bibliography
    - The most common styles are `apa`, `mla`, and `chicago`
- A very good guide on citation is on the Overleaf website
    - Bibliography management in LaTeX
    - Bibliography management with biblatex

Adding the bibliography package `biblatex`

`\usepackage[style=apa]{biblatex}`

- The `style` option specifies the style of the bibliography
    - The `apa` style is based on the American Psychological Association's citation style
    - You can find a list of all the available styles in the `biblatex` documentation
- You also need to specify the `.bib` file that contains your references

Math Mode Revisited
000000

Creating Bibliographies
00000●000000

Exporting from statistical software to LATEX
0000

Knitr/Sweave
00

The .bib file

- The .bib file is a plain text file that contains all the references you want to include in your bibliography
  - Each reference is stored in a separate entry
  - The format of the entries is specified by the biblatex package
-
- It follows a LATEX-like syntax, with each entry starting with an @ symbol
  - The type of the entry is specified after the @ symbol
  - The fields of the entry are enclosed in curly braces {}
- Don't try to write the .bib file by hand!
  - Zotero can export your references to a .bib file
  - You only need to put it in the same folder as your .tex file or upload it to Overleaf

The `.bib` file

```
@article{einstein,
  author = {Albert Einstein},
  title = {Zur Elektrodynamik bewegter K{\"o}rper},
  journal = {Annalen der Physik},
  volume = {322},
  number = {10},
  pages = {891--921},
  year = {1905},
  publisher = {Wiley-VCH},
  doi = {10.1002/andp.200510497}
}
```

Math Mode Revisited
000000

Creating Bibliographies
00000000●0000

Exporting from statistical software to LATEX
0000

Knitr/Sweave
00

Adding the bibliography file

\addbibresource{references.bib}

- The \addbibresource command specifies the .bib file that contains your references
    - You need to put the .bib file in the same folder as your .tex file or upload it to Overleaf
    - The file extension .bib is optional
- You can add multiple .bib files to your document
    - Just use the \addbibresource command multiple times
- The \printbibliography command prints the bibliography in your document

Adding the bibliography

\printbibliography

- The \printbibliography command prints the bibliography in your document
    - You can specify the title of the bibliography by passing an argument to the command
    - You can also filter the bibliography by passing options to the command
    - The options are specified in square brackets []

Math Mode Revisited
○○○○○○

Creating Bibliographies
○○○○○○○○○○●○○

Exporting from statistical software to LaTeX
○○○○

Knitr/Sweave
○○

Citation commands

- To include a citation in your document, you need to use the \cite command
    - The \cite command takes the key of the reference you want to cite as an argument
    - You can cite multiple references by separating the keys with commas
    - The \cite command prints the citation in the text and adds the reference to the bibliography

Math Mode Revisited
000000

Creating Bibliographies
00000000000●0

Exporting from statistical software to LaTeX
0000

Knitr/Sweave
00

Citation commands

\cite{einstein}

- The \cite command takes the key of the reference you want to cite as an argument
    - You can cite multiple references by separating the keys with commas
    - The \cite command prints the citation in the text and adds the reference to the bibliography
- The \textcite command is similar to the \cite command, but it prints the author's name in the text
- The \parencite command is similar to the \cite command, but it adds parentheses around the citation

Citation commands

```
\textcite{einstein} showed that \ldots

\parencite{einstein}

\cite{einstein}

\cite{einstein,dirac}

\cite{einstein,dirac,bohr}
```

Exporting from statistical software to LATEX

Exporting from statistical software to LaTeX

- If you are using statistical software to analyze your data, you can export the results to LaTeX
    - This is useful if you want to include tables, figures, or other output in your document
    - Most statistical software packages have built-in support for exporting to LaTeX
- Here, we will focus on how to export tables from R and Stata to LaTeX
    - Both have packages that make it relatively easy to export tables to LaTeX

The export environment in R

- Many options exist for exporting tables from R to LaTeX
    - `stargazer` is likely the most known package for exporting tables to LaTeX
    - However, `modelsummary` is a more modern and flexible package
- Other packages, such as `kableExtra`, `xtable`, and `huxtable`, can also be used to export tables to LaTeX
    - `kableExtra` is particularly useful for creating complex tables with formatting

An example with `stargazer`

- We export the `mtcars` dataset to a LATEX table using `stargazer`

```
library(stargazer)

data(mtcars)

stargazer(mtcars,
          type = "latex",
          summary = T,
          title = "Descriptive Statistics")
```

Math Mode Revisited
oooooo

Creating Bibliographies
oooooooooooo

Exporting from statistical software to LATEX
oooo

Knitr/Sweave
●o

Knitr/Sweave

Math Mode Revisited
oooooo

Creating Bibliographies
oooooooooooo

Exporting from statistical software to LATEX
oooo

Knitr/Sweave
o●

Final Comments