

Introduction to TeX and Accessibility

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Accessibility Statement: this PDF is WCAG2.1AA compliant and was manually checked.

Outline

1 Background on Accessibility

2 Background on TeX

3 Interactive Session

Setting up Beamer

Typesetting Math

Formatting and Stylizing

What is Accessibility?

According to CAST:

“Educational materials and technologies are ‘accessible’ to people with disabilities if they are able to ‘acquire the same information, engage in the same interactions, and enjoy the same services’ as people who do not have disabilities.”

This is distinct from ‘accessible’ in the sense of ‘open access’ or ‘universal design in learning.’

What is my role?

Texas Administrative Code 206.70 and Texas A&M University System Policy [...] require all publicly posted documents to conform with WCAG2.0AA.

The National Science Foundation requires the REU to publicly post our results.

You **are not** required to know WCAG2.0AA; however, you **are** required to know TeX.

What is the plan?

On Thursday, you have five-minute presentations on your research topic. This is essentially a “practice run” – nobody else is invited and you can practice Beamer.

In the meantime, you can reach out to me via email or Discord for TeX help. Discord has a TeXiT bot which is good practice. Pending NSF funding, I will do a second TeX presentation for typesetting articles.

History and Terminology

TeX was invented by Donald Knuth and first released in 1978.
LaTeX was invented by Leslie Lamport and first released in 1984.

Most mathematicians compile with pdfLaTeX; I use LuaLaTeX but arXiv does not support it.

Cultural Considerations

Most mathematicians learn LaTeX by themselves, rather than being taught as part of a standard course.

As a result, many mathematicians are sensitive about sharing their LaTeX files.

Keep in mind LaTeX is free.

Beamer Class

Begin your TeX file with

```
\documentclass[13pt]{beamer}
```

In TeX, we have the syntax:

- A backslash `\` begins a command.
- Curly braces `{ }` contain the parameters of the command. Multiple parameters are allowed.
- Square brackets `[]` contain optional parameters.

Note that this **does not** generate 13 point font size! For accessibility, I recommend 13–14 font size.

Beamer Style

After the `documentclass` command, enter

```
\usetheme{Pittsburgh}
```

You can browse other Beamer styles on Overleaf.

Now try something like:

```
\begin{document}
```

```
\frame {
```

```
Hello world!
```

```
}
```

```
\end{document}
```

Try to compile with `pdflatex`! Note that some commands allow parameters to have line breaks.

Beamer Navigation Symbols

Let us add some customizations in Beamer. In the preamble (everything in between documentclass and the document text), try experimenting with

```
\setbeamertemplate{navigation symbols}{\insertframenumbers}
\setbeamertemplate{footline}{\insertframenumbers/\inserttotalframenumbers}
```

You can use the % sign at the beginning of the line to comment out lines.

For accessibility reasons, I remove navigation links and instead use a clicker and table of contents.

Beamer Title Page

The first slide should be a title page. In the preamble, type in

```
\title{The Tortured Poets Department}
```

```
\author{Taylor Alison Swift}
```

```
\institute{The Music Industry}
```

```
\date{April 19, 2024}
```

and have the first frame consist of a “titlepage” command with no parameters.

Try compiling this and let me know if there are issues!

Beamer Slide Titles

Assistive Technologies use distinct slide titles to navigate slides. At the beginning of each frame, use the “frametitle” command with one parameter to indicate a slide title.

Let's try setting up the tableofcontents command using sections and subsections in between frames.

Pauses (not recommended)

You can use the `\pause` command to slowly reveal a slide.

Math mode and environments

There are two main ways to separate math text from regular text.

- 1 In–line math is math within a regular line, such as:
Of Taylor Swift’s re–recordings, she has finished $\frac{2}{3}$ of them.
 - In TeX, this is toggled by dollar signs \$... \$
 - In LaTeX, this is an environment `\(... \)`

- 2 Displayed math is math within its own line, such as:

$$\int (x + 1989)^{22} dx = \frac{(x + 1989)^{23}}{23} + C$$

- In TeX, this is toggled by double dollar signs \$\$... \$\$
- In LaTeX, this is an environment `\[... \]` or `\begin {equation} ... \end {equation}`

Symbols and Syntax

In the preamble, load the AMS packages by typing in

```
\usepackage{amsmath,amssymb,amsfonts,amsthm}
```

For individual symbols (technically commands with no parameters), you can look them up on DeTeXify. Greek letters, such as σ or Ξ , are lower-case or upper-case, like `\sigma` or `\Xi`.

Subscripts are superscripts usually interact intuitively, using `_` and `^`. Spend a few minutes to try out the “lim”, “sum”, and “int” commands! Maybe use some two digit numbers too...

$$\lim_{a \rightarrow 13} \int_7^{15} \frac{dx}{x - a} = \infty$$

Common Commands

There are a few common commands that involve multiple parameters, such as

- Fractions are displayed using the `tfrac`, `dfrac` or `frac` commands with two parameters.
- Binomials are displayed using `binom` command with two parameters

$$\binom{2}{1}_q = 1 + q$$

Multi-line Equations

If an equation goes across multiple lines and you are not opinionated about alignment, then multiline environment works well

$$\binom{13}{1}_q = 1 + q + q^2 + q^3 + q^4 + q^5 + q^6 + q^7 + q^8 + q^9 + q^{10} + q^{11} + q^{12} \quad (1)$$

Use double backslash `\\` to end a line and start a new line.

Use `multiline*` to remove equation numbering. The `*` generally removes equation numbering.

An “environment” is anything with a `\begin` and `\end`

Alignment of Equations

If you are opinionated about the alignment, such as in this example,

You never gave a warning sign

I gave so many signs

you have a few options.

This slide gave me the most error messages! I had to remove the AUX files a few times.

Alignment of Equations, part 2

Most mathematicians load the amsmath package (in contrast with linguists). In amsmath, there are align(ed), gather and split. In LaTeX, there are array and tabular. For all of these, the ampersand & is used as an alignment tab.

For accessibility reasons, please **only** use array and tabular for information that is presented as tables!

Alignment of Equations, an example

$$\binom{13}{1}_q = \sum_{k=0}^{12} q^k \\ = 1 + q + q^2 + \cdots + q^{12}$$

```
\begin{align*}
\binom{13}{1}_q &= \sum_{k=0}^{12} q^k \\
&= 1 + q + q^2 + \cdots + q^{12}
\end{align*}
```

Matrices

amsmath offers a variety of matrix environments. Just remember that `&` is an alignment tab and `\\` ends a line. The environment needs to be inside math mode or an equation environment, otherwise you will get “missing \$” error. Here are `pmatrix` and `bmatrix`:

$$\begin{pmatrix} 0 & 1 \\ q^2 & \frac{2}{3} \end{pmatrix} \quad \begin{bmatrix} 0 & 1 \\ q^2 & \frac{2}{3} \end{bmatrix}$$

Including Graphics

To include graphics, use the “graphicx” package. I also use the “float” package to keep the graphic where I like it. The includegraphics command allows for alternative text and customized height. Make sure to include the filename extension. The center environment is what I use to center it on the page.



Lists

Use the enumerate environment for ordered lists and itemize environment for unordered lists. Please **do not** use lists just to break up paragraphs. Lists can be nested:

① Debut

- None

② Fearless

- Album of the Year
- Best Country Album
- Best Country Song (White Horse)
- Best Female Country Vocal Performance (White Horse)

Spacing and Font Sizes

The “setspace” package lets you add in spacing. You can use the commands `vfill`, `vspace`, `hspace` in the document. The `setstretch` command in the preamble can let you expand line spacing (for accessibility).

To change font sizes in the document, you can use the commands `Huge`, `Large`, `tiny`, `small`, and so on.

Color

The package `xcolor` comes with pre-defined colors and lets you define custom colors:

I gave so many signs

comes from:

```
\textcolor{barbie}{I gave so many signs}
```

with this in the preamble:

```
\definecolor{barbie}{HTML}{DA1884}
```

I pick five colors all of which are mutually WCAG2.1AA compliant.

Tables

I'll do tables at the next presentation.