Introduction to LaTeX

Brian McCutchon

What is LaTeX?

What is LaTeX?

- A document preparation/typesetting system

What is LaTeX?

- A document preparation/typesetting system
- A markup language

What is LaTeX?

- A document preparation/typesetting system
- A markup language
- Used by the vast majority of Math and Physics journal submissions

What is LaTeX?

- A document preparation/typesetting system
- A markup language
- Used by the vast majority of Math and Physics journal submissions
- Used to create this presentation and the flyer for this event

What is LaTeX?

- A document preparation/typesetting system
- A markup language
- Used by the vast majority of Math and Physics journal submissions
- Used to create this presentation and the flyer for this event
- Better than Microsoft Word

What is LaTeX?

- A document preparation/typesetting system
- A markup language
- Used by the vast majority of Math and Physics journal submissions
- Used to create this presentation and the flyer for this event
- Better than Microsoft Word
- TeX was created by Donald Knuth
- LaTeX was created by Leslie Lamport to make TeX more user friendly

Basic LaTeX document structure

```
\documentclass{article}

% This is where you put metadata
% like the author, title, and date.

\begin{document}

This is where your content goes.

\end{document}
```

Figure 1: A minimal LaTeX document

Breaking it down

- This line indicates the type of document:
  `\documentclass{article}`
- These tags define the document environment:
  `\begin{document}...\end{document}`

Math mode

Math mode

- Inline: simplest, put math between dollar-signs ($)
  - `$x^2 + 1$` gives $x^2 + 1$

Math mode

- Inline: simplest, put math between dollar-signs ($)
  - `$x^2 + 1$` gives $x^2 + 1$
- Display: used for big/important equations, centers them on their own line; use `\[ ... \]` to enclose these
  - `\[ a_3 x^3 + a_2 x^2 + a_1 x + a_0 \]` gives:

$$a_3 x^3 + a_2 x^2 + a_1 x + a_0$$

Math mode

- Inline: simplest, put math between dollar-signs ($)
  - `$x^2 + 1$` gives $x^2 + 1$
- Display: used for big/important equations, centers them on their own line; use `\[ ... \]` to enclose these
  - `\[ a_3 x^3 + a_2 x^2 + a_1 x + a_0 \]` gives:

$$a_3 x^3 + a_2 x^2 + a_1 x + a_0$$

  - There are even cooler ways to do display math that will be explained later in the presentation

Commands

- Every command has this form: `\command{arg1}{arg2}...`

Commands

- Every command has this form: `\command{arg1}{arg2}...`
- Examples:
  - `\alpha` gives α
  - `\sqrt{2}` gives $\sqrt{2}$
  - `\frac{x}{2}` gives $\frac{x}{2}$

Commands

- Every command has this form: `\command{arg1}{arg2}...`
- Examples:
  - `\alpha` gives α
  - `\sqrt{2}` gives $\sqrt{2}$
  - `\frac{x}{2}` gives $\frac{x}{2}$
- Some commands take optional parameters: `\command[optional]{arg1}{arg2}...`

Commands

- Every command has this form: `\command{arg1}{arg2}...`
- Examples:
  - `\alpha` gives α
  - `\sqrt{2}` gives $\sqrt{2}$
  - `\frac{x}{2}` gives $\frac{x}{2}$
- Some commands take optional parameters: `\command[optional]{arg1}{arg2}...`
  - `\sqrt[3]{x}` gives $\sqrt[3]{x}$

Commands

- Every command has this form: `\command{arg1}{arg2}...`
- Examples:
  - `\alpha` gives α
  - `\sqrt{2}` gives $\sqrt{2}$
  - `\frac{x}{2}` gives $\frac{x}{2}$
- Some commands take optional parameters: `\command[optional]{arg1}{arg2}...`
  - `\sqrt[3]{x}` gives $\sqrt[3]{x}$
- The above examples are all math mode commands, but some commands are used in text mode (e.g. maketitle) and some of these are used in the preamble (author, date, title)

Structuring your document

- Create automatically numbered sections and subsections with `\section{Name}`, `\subsection{Name}`, and `\subsubsection{Name}` or even `\chapter{Name}`

Structuring your document

- Create automatically numbered sections and subsections with `\section{Name}`, `\subsection{Name}`, and `\subsubsection{Name}` or even `\chapter{Name}`
- If you don't want numbering, use `\section*{Name}`

Structuring your document

- Create automatically numbered sections and subsections with `\section{Name}`, `\subsection{Name}`, and `\subsubsection{Name}` or even `\chapter{Name}`
- If you don't want numbering, use `\section*{Name}`
- Put in an automatically generated table of contents from these sections with `\tableofcontents`

Structuring your document

- Create automatically numbered sections and subsections with `\section{Name}`, `\subsection{Name}`, and `\subsubsection{Name}` or even `\chapter{Name}`
- If you don't want numbering, use `\section*{Name}`
- Put in an automatically generated table of contents from these sections with `\tableofcontents`
  - See also: `\listoffigures` and `\listoftables`

Environments

- Like commands, but bigger

Environments

- Like commands, but bigger
- Used to format blocks of text or math

Environments

- Like commands, but bigger
- Used to format blocks of text or math
- Format:
  `\begin{environmentname}...\end{environmentname}`

Environments

- Like commands, but bigger
- Used to format blocks of text or math
- Format:
  `\begin{environmentname}...\end{environmentname}`
- Common environments: document, itemize/enumerate, center, abstract

Environments

- Like commands, but bigger
- Used to format blocks of text or math
- Format:
  `\begin{environmentname}...\end{environmentname}`
- Common environments: document, itemize/enumerate, center, abstract
- Use the "abstract" environment to define an abstract

Packages

- Packages provide more commands and environments

Packages

- Packages provide more commands and environments
- Add a package to your document by putting this in the preamble: `\usepackage[options]{packagename}`

Packages

- Packages provide more commands and environments
- Add a package to your document by putting this in the preamble: `\usepackage[options]{packagename}`
- Examples
  - `\usepackage{amsmath}` provides many useful environments (equation, align, bmatrix, etc.)
  - `\usepackage{amssymb}` provides many useful commands that create symbols (mathbb, lhd)
  - `\usepackage{amsthm}` provides commands for creating theorems, lemmata, corollaries, definitions, and more!
  - `\usepackage[margin=1in]{geometry}` sets page margins to 1 inch

Equations and References

```
\begin{equation}
    e^{\pi i} + 1 = 0
    \label{eqn:euler}
\end{equation}

Equation~\ref{eqn:euler} shows Euler's
   identity.
```

Figure 2: A labeled equation with a reference to it

Figures and References

```
\begin{figure}[t]
    \centering
    Figure goes here.
    \caption{A really cool figure that
       illustrates my point perfectly}
    \label{fig:myfig}
\end{figure}

This is a reference to figure~\ref{fig:myfig
   }.
```

Figure 3: The structure of a figure, with a reference to it below

Bibliography

```
\bibliography{mybib}
\bibliographystyle{plain}
```

Figure 4: How to include a bibliography named "mybib"

- Include a bibliography file as shown in figure 4
- Use the package "cite" for easy citations
- Reference an entry in this bibliography using `\cite{bibentryname}`

Making a Bibliography

```
@article{doe,
    author      = "John Doe",
    title       = "How to farm corn",
    journal     = "The Farmer's Periodical",
    year        = "2018",
}
```

Figure 5: An example bibliography entry; this would go in "mybib.bib"

Miscellaneous

- quotation marks: ``hi'' gives “hi”

Miscellaneous

- quotation marks: ``hi'' gives “hi”
- 3 lengths of dashes: hyphen (-), en dash (–), em dash (—)

Miscellaneous

- quotation marks: ``hi'' gives “hi”
- 3 lengths of dashes: hyphen (-), en dash (–), em dash (—)
- Empty lines between paragraphs

Miscellaneous

- quotation marks: ``hi'' gives “hi”
- 3 lengths of dashes: hyphen (-), en dash (–), em dash (—)
- Empty lines between paragraphs
- Forced line breaks with \\

Miscellaneous

- quotation marks: ``hi'' gives “hi”
- 3 lengths of dashes: hyphen (-), en dash (–), em dash (—)
- Empty lines between paragraphs
- Forced line breaks with \\
- Comments with %

Miscellaneous

- quotation marks: ``hi'' gives “hi”
- 3 lengths of dashes: hyphen (-), en dash (–), em dash (—)
- Empty lines between paragraphs
- Forced line breaks with \\
- Comments with %
- Escaping $, %, {, }

Further Reading

- Detexify — look up symbols easily

Further Reading

- Detexify — look up symbols easily
- LaTeX Wikibook

Further Reading

- Detexify — look up symbols easily
- LaTeX Wikibook
- Google — No, really