Quick and Dirty Introduction to LaTeX

Lecture 1: Typesetting Non-Mathematics

William M. Faucette

University of West Georgia

Fall Semester, 2022

1 What is TEX? What is LATEX?

2 Where to Find LATEX

3 Document Structure in LATEX

4 Document Classes

5 Preamble and Body

6 Modes in LATEX

7 Text Mode

What is TEX? What is LATEX?

What is TEX?

The powerful typesetting system TEX was developed by Donald E. Knuth of Stanford University from 1977 to 1986.

It is the worldwide standard for typesetting professional scientific articles, papers, and books.

What is TEX?

The typesetting system TEX has a steep learning curve, precisely because it is so flexible and powerful.

However, it is certainly possible for students to learn enough TEX to be able to prepare assignments.

What is TEX?

The power of TEX lies in its ability to handle complicated technical text and displayed mathematical formulas. When coupled with a high-quality phototypesetter, TEX produces results equal in quality and appearance to those produced by the finest traditional typesetting systems.

What is LaTeX?

TeX comes in several dialects.

The first (and original) dialect is PlainTeX.

The American Mathematical Society has produced a dialect called $\mathcal{AMS}$-TeX.

The predominant dialect for mathematics is LaTeX, written by Leslie Lamport. It is this dialect we will talk about in this slideshow.

What is LaTeX?

There are two ways to pronounce LaTeX: lay-tek or lah-tek. We use the first pronunciation.

Everyone agrees, however, that you should not pronounce LaTeX like the word latex: this is not that kind of workshop.

Where to Find LaTeX

Using TEX on the Web

Dr. Leach told me about this site which he recommends. This is a web-based TEX engine. You just sign up for a free account.

You can find it at https://www.overleaf.com/.

Installing TEX on your local machine

You can also install a TEX engine on your computer.

For Linux, the current TEX Live distribution is freely available.

For Mac, the current MacTEX contains everything you need and it is also freely available.

For PCs, there are MiKTEX or proTEXt or TEX Live. I believe these are also freely available.

You can find all of these installations at https://www.latex-project.org/get/.

Document Structure in LaTeX

Basic Document Structure in LaTeX

A TeX document is simply a text file. Every TeX document contains these three lines:

```
\documentclass{...}
\begin{document}
    ⋮   ⋮   ⋮
\end{document}
```

The backslash indicates a **control word** or **control symbol**.

Document Classes

Types of document classes

The document class can be

- article
- report
- book
- letter
- beamer

among many, many others. Each document class comes with *options* which are included in brackets between the \documentclass command and the name of the document class.

Example of a document class

The default document class in the LaTeX template is

```
\documentclass[11pt, oneside]{article}
```

Here, the items in brackets are options for the document class. The "`11pt`" sets the font to 11 points and "`oneside`" indicates the document will be printed on one side, not front and back.

The `\documentclass` command can take a *titlepage* option: `\documentclass[titlepage ]{article}`

Preamble and Body

The Preamble and the Body

A LaTeX document has a **preamble** and a **body**.

The **preamble** starts with the \documentclass{} line and ends with \begin{document} line.

The preamble contains commands like

```
\title{}
\author{}
\institute{}
\date{}
```

```
\thanks{}
\begin{titlepage}
\end{titlepage}
```

and the definitions of any control sequences you may want to define.

In order to produce the title, use the command `\maketitle` just **after** the \begin{document} line.

The Preamble and the Body

There is usually a \pagestyle command in the preamble. The choices are

- \pagestyle{plain} is the default, which puts the page number at the center of the bottom of the page and provides no headings.
- \pagestyle{empty} provides neither page numbers nor headings.
- \pagestyle{headings} will provide page numbers and headings from any \section's that you are using.
- \pagestyle{myheadings} will provide page numbers and custom headings.

These commands can also be applied to a single page using \thispagestyle instead of \pagestyle.

The Preamble and the Body

The preamble also contains the

\usepackage{}

command. This command is used to load macro packages so you can use the control sequences defined there in your document.

The most common packages are:

- global: *babel*, *array*, *fancyheadings*, *fancybox*, *fancydr*, ...
- mathematics: *amsmath*, *amsfonts*, *amssymb*, *theorem*, ...
- graphics: *graphicx*, *epsfig*, ...

These packages are loaded using the \usepackage{} command, either individually or sequentially separated by commas.

The Preamble and the Body

The **body** of the document is everything that appears between

\begin{document}

and

\end{document}

This is where you put everything you want to appear on the page.

Modes in LaTeX

Modes in LaTeX

There are basically three modes in LaTeX.

One mode is **text mode**. This is the default mode and the mode in which you type the text in the body of your article.

One mode is **math mode**. This mode begins and ends with a single dollar sign $. You use this mode for inline mathematics.

Modes in LaTeX

The last mode is **display math mode**.

This mode begins with \[and ends with \].

You use this mode for mathematics you want separated from the text above and below and centered in the middle of the page.

In TeX, double dollar signs $$ are used to begin and end display math mode. These are not recommended in LaTeX since they can interfere with spacing.

Text Mode

Text Mode

Writing text in a LaTeX document is easy.

Once you are inside the body of the document all you have to do is start typing. When you compile the code LaTeX will take care of all the text formatting based on any commands and packages used.

Text Mode

There are ten characters you cannot use in text mode. This is because those characters are used in special ways inside LaTeX.

These are the ten reserved characters and how they're used in LaTeX.

%	Comments
{...}	Processing block
$	Math mode
#	Macro parameter
\	Command
~	Nonbreaking space
&	Alignment tag in arrays
^ and _	Superscript and Subscript

Text Mode

This is how you put reserved characters in text:

- Use \$ to get a dollar sign
- Use \% to get a percent sign
- Use _ to get an underscore
- Use \^{} to get a caret ^.
- Use \{ to get an open brace {.
- Use \} to get a close brace }.
- Use \& to get an ampersand &.
- Use \# to get a hashtag #.
- Use \backslash (in math mode) to get a backslash \.
- Use \sim (in math mode) to get a tilde $\sim$.

Text Mode

There are a few things you need to know that are special about text mode.

- Multiple spaces between words in a paragraph are treated as a single space.
- A blank line indicates the beginning of a new paragraph.

Document Structure

Command	Comment
\part{}	available only for report or book
\chapter{}	available only for report or book
\section{}	
\subsection{}	
\paragraph{}	
\subparagraph{}	
\appendix{}	indicate the beginning of appendices

Text Mode

You can change font sizes:

- \Huge{text} gives you **text**
- \huge{text} gives you **text**
- \LARGE{text}gives you **text**
- \Large{text} gives you **text**
- \large{text} gives you text
- \normalsize{text}gives you text
- \small{text} gives you text
- \footnotesize{text} gives you text
- \scriptsize{text} gives you text
- \tiny{text} gives you text

Text Mode

You can change font type:

- \textrm{roman} gives you roman font
- \textsf{sans serif} gives you Sans Serif font
- \textit{italic} gives you *italic*
- \textbf{bold} gives you **bold**
- \textsc{small caps} gives you SMALL CAPS
- \texttt{typewriter} gives you `typewriter`
- \textup{Upright} gives you Upright
- \textsl{slanted} gives you *slanted*

Text Mode

There are a plethora of control words and control symbols that give you text accents:

- \`{e} gives you è.
- \'{e} gives you é.
- \"{a} gives you ä.
- \={a} gives you ā.
- \.{a} gives you ȧ.
- \tilde{n} gives you ñ.

Text Mode

There are also quite a few control words that give you special text characters:

- \textbackslash gives you \
- \textless gives you <
- \textgreater gives you >
- \copyright gives you ©
- \pounds gives you £
- \textregistered gives you ®

By the way, < in text mode gives you ¡.

The symbol > in text mode gives you ¿.

The symbol | in text mode gives you —.

Text Mode

There are actually three different dashes in LaTeX:

- The character - gives you a hyphen. It is used for hyphenating words.
- The sequence -- gives you an en dash. It is used for ranges of things, such as “pages 2–15”.
- The sequence --- gives you an em dash. It is used for separating phrases, such as

  The house rule is simple—clean up after yourself!

Environments

Some part of the code is specific or must have a temporary property: environment.

Environments start with the code

```
\begin{environment name}
```

and ended with

```
\end{environment name}
```

Environments

As an example, we have the center environment: The code

```
\begin{center}
This text is centered.
\end{center}
```

gives the result

This text is centered.

Listing Environments

There are three listing environments:

- itemize: unnumbered listing
- enumerate: numbered listing
- description: description listing

The style of these listing environments is controlled by the packages you load.

Listing Environments

The itemize environment is illustrated here.

The code

```
\begin{itemize}
\item itemize: unnumbered listing
\item enumerate: numbered listing
\item description: description listing
\end{itemize}
```

gives the result

- itemize: unnumbered listing
- enumerate: numbered listing
- description: description listing

Listing Environments

The enumerate environment is illustrated here.

The code

```
\begin{enumerate}
\item Item \#1
\item Item \#2
\item Item \#3
\end{enumerate}
```

gives the result

1. Item #1
2. Item #2
3. Item #3

Listing Environments

The description environment is illustrated here.

The code

```
\begin{description}
\item{First term}Definition of first term
\item{Second term}Definition of second term
\item{Third term}Definition of third term
\end{description}
```

gives the result

First term Definition of first term

Second term Definition of second term

Third term Definition of third term

Crossreferences

Sometimes you want to refer to another section, chapter, equation, or figure.

To do this, you use the \label{label name} to give the section, chapter, equation, or figure a label and use \ref{label name} to refer back to the section, chapter, equation, or figure.

The command \eqref{label name} puts parentheses around the label, but this requires you load the package amsmath.

Crossreferences

As an example, the code

```
We have the numbered displayed equation
\begin{equation}\label{eqn1}
e=mc^2
\end{equation}
Referring back to Equation (\ref{eqn1}), we note that \dots
```

gives the result

We have the numbered displayed equation

$$e = mc^2 \tag{1}$$

Referring back to Equation (1), we note that ...

Table and Tabular environments

Tables are put into text using the table and tabular environments.

The code

```
\begin{table}
 \centering\small
 \begin{tabular}{ll}
  \multicolumn{1}{c}{\textit{Author}}
   &\multicolumn{1}{c}{\textit{Piece}}  \\ \hline
  Bach          &Cello Suite Number 1  \\
  Beethoven     &Cello Sonata Number 3 \\
  Brahms        &Cello Sonata Number 1
 \end{tabular}
 \caption{Top cello pieces}
 \label{tab:cello}
\end{table}
```

gives the result . . .

Table and Tabular environments

Author	*Piece*
Bach	Cello Suite Number 1
Beethoven	Cello Sonata Number 3
Brahms	Cello Sonata Number 1

Table 1: Top cello pieces

Table and Tabular environments

The tabular environment actually typesets the table while the table environment is a container that places the table on the page.

The command \hline draws a horizontal line.

The command \multicolumn with the two options after it allow us to typeset the column titles formatted separately from the table. They allow us to typeset the column titles centered and in italic font.

The command \caption gives the table a caption.

The command \label provides a reference tag for the table.

Figure environments

Figures are put into text using the figure environment.

The code

```
\begin{figure}[h!]
\centering
\includegraphics[scale=0.15]{Figs/faucette.jpg}
\end{figure}
```

gives the result . . .

Figure environments

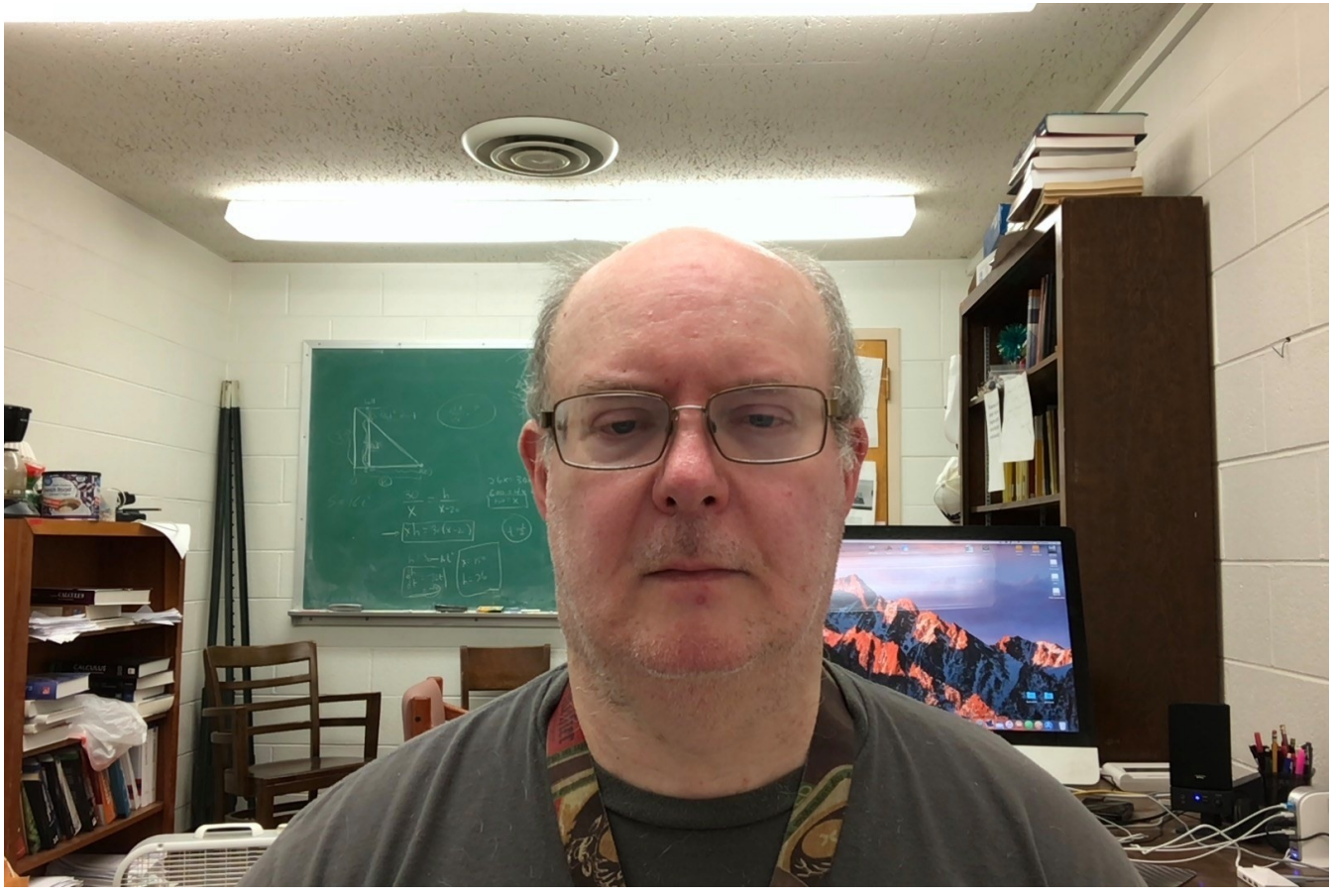

Figure environments

The option [h!] tells LaTeX to put the figure *here* as opposed to putting it somewhere else on the page (or on another page).

```
\begin{figure}[h!]
\centering
\includegraphics[scale=0.15]{Figs/faucette.jpg}
\end{figure}
```

Figure environments

The command \centering centers the picture.

```
\begin{figure}[h!]
\centering
\includegraphics[scale=0.15]{Figs/faucette.jpg}
\end{figure}
```

Figure environments

The command \includegraphics says you're including a picture and the option [scale=0.15] scales the picture to 15% of its original size.

```
\begin{figure}[h!]
\centering
\includegraphics[scale=0.15]{Figs/faucette.jpg}
\end{figure}
```

Figure environments

The code Figs/faucette.jpg tells LaTeX that the picture is in the file `faucette.jpg` which is located in the folder `Figs`.

```
\begin{figure}[h!]
\centering
\includegraphics[scale=0.15]{Figs/faucette.jpg}
\end{figure}
```