THIS IS AN INTRODUCTION TO \LaTeX

Introduction to \LaTeX

Jimmy Broomfield

University of Minnesota, November 7, 2016
Outline

- Introduction
- Installation
- Getting Started
- Basic Commands
- Mathematics
- Graphics
- Tables
- User Defined Commands
- Bibliographies
• **Typography** is the art of text arrangement and design, whereas **typesetting** is the “process” of applying typographic elements to text in an artful way.

• Latex was created by scientist to give a way to typeset scientific writing. This gives a way to beautifully typeset mathematics.

• Latex can be used to create articles, books, presentations, resumes/cvs, etc.
Introduction

Why \TeX?  

- **Typography** is the art of text arrangement and design, whereas **typesetting** is the “process” of applying typographic elements to text in an artful way.

- \LaTeX\ was created by scientist to give a way to typeset scientific writing. This gives a way to beautifully typeset mathematics.

- \LaTeX\ can be used to create articles, books, presentations, resumes/cvs, etc.
Introduction

Why LaTeX?

- **Typography** is the art of text arrangement and design, whereas **typesetting** is the “process” of applying typographic elements to text in an artful way.

- Latex was created by scientists to give a way to typeset scientific writing. This gives a way to beautifully typeset mathematics.

- Latex can be used to create articles, books, presentations, resumes/cvs, etc.
Introduction

Word vs LaTeX

\[ S_n = \sum_{i=1}^{n} \frac{(-1)^i}{i} \]

\[ (x + a)^n = \sum_{k=0}^{n} \binom{n}{k} x^k a^{n-k} \]

\[ A = \begin{bmatrix} a_{11} & \cdots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{n1} & \cdots & a_{nn} \end{bmatrix} \]
## Installation

### Installing \LaTeX

**Windows**
Miktex/TexWorks will have to be installed by the user.

**Mac OS**
MacTeX comes pre-installed.

**Linux**
Will come pre-installed with your distro.

**Online**
If you prefer to not install \LaTeX, you can use overleaf.com or sharelatex.com.
## Installation

### Installing \LaTeX

<table>
<thead>
<tr>
<th>Windows</th>
<th>MikTeX/TexWorks will have to be installed by the user.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mac OS</td>
<td>MacTeX comes pre-installed.</td>
</tr>
<tr>
<td>Linux</td>
<td>Will come pre-installed with your distro.</td>
</tr>
<tr>
<td>Online</td>
<td>If you prefer to not install \LaTeX, you can use overleaf.com or sharelatex.com.</td>
</tr>
</tbody>
</table>
Installation

Installing \LaTeX

**Windows**
Miktex/TexWorks will have to be installed by the user.

**Mac OS**
MacTeX comes pre-installed.

**Linux**
Will come pre-installed with your distro.

**Online**
If you prefer to not install \LaTeX, you can use overleaf.com or sharelatex.com.
Installation

Installing LaTeX

Windows
Miktex/TexWorks will have to be installed by the user.

Mac OS
MacTeX comes pre-installed.

Linux
Will come pre-installed with your distro.

Online
If you prefer to not install LaTeX, you can use overleaf.com or sharelatex.com.
Your First Document

The basics

```latex
\documentclass{article}
\begin{document}
  Hello world!
\end{document}
```
\documentclass{article}
\begin{document}
\section{Introduction}
This is an introduction to the article!
\section{Section}
This is a section!
\subsection{Subsection}
This is a subsection!
\subsubsection{Subsubsection}
This is as far as it goes for sections
\end{document}
## Special Characters

\#, \$, \%, ^, &, _, {, }, ~, \textbackslash, \LaTeX

## Horizontal Space

\, \; \. \hspace{}, \phantom{1cm}, \indent, \noindent, \quad, \qquad, \hfill

## Vertical Space

\\, \newline, \vspace{1cm}, \ \ \, \newpage, \vfill
Exercise
Using Special Characters and Spacing

Use \LaTeX to produce the following text.

This year we will spend $3,000 to fix our motorcycle, but Johnson & Johnson will spend close to $1.5 million to pay clerks. Did you know that the character \# is called an octothorpe? This character often shows up in programming to comment out lines, and it is typed as \# in \LaTeX.

Sometimes one uses three quotations instead.

However this is specific to python and isn’t done throughout many of the other languages.

text
  text
    more text
Basic Commands
Changes to Font

- **Bold Font** is produced by using `\textbf{ }`
- **Italic Font** is produced by using `\emph{ }`
- **Italic Font** can also be produced by using `\textit{ }`
- **Underlined text** is produced by using `\underline{ }`
- **Code like** `def f(x):` **is produced by using** `\texttt{ }`
Basic Commands

Changes to Font Size

- \tiny{ } Text
- \scriptsize{ } Text
- \footnotesize{ } Text
- \small{ } Text
- \normalsize{ } Text
- \large{ } Text
- \Large{ } Text
- \LARGE{ } Text
- \huge{ } Text
- \Huge{ } Text
Basic Commands

Alignment

Left Flush alignment is default

Center alignment is produced by
\begin{center} \end{center}

Right alignment is produced by
\begin{flushright} \end{flushright}
Basic Commands

Bulleted Lists

Bulleted lists are produced by:

\begin{itemize}
  \item Text 1
  \item Text 2
\end{itemize}

Numbered Lists

Numbered lists are produced by:

\begin{enumerate}
  \item Text 1
  \item Text 2
\end{enumerate}
Basic Commands

Preamble

\documentclass[12pt, letterpaper]{article}
\usepackage{package 1, package 2}
\title{First document}
\author{Your Name}
\date{November 2016}
\begin{document}
\begin{titlepage}
\maketitle
\end{titlepage}
\maketitle
\end{titlepage}

In this document some extra packages were added. There are two packages and fontsize parameters have changed.
\end{document}
Write a basic \LaTeX document with the following requirements

- Title your document “My First Proper \LaTeX Document.”
- Add your name as the author.
- Date the document with today’s date.
- Add a title page with the title, your name, and the date.
- Add the package \texttt{amsmath}.
- Add an introduction with the text “This is an introduction.”
- Add a section titled “section” with the text “This is a section.”
Debug Exercise 1
Don’t Be Scared

Debug the following
\documentclass{article}
\begin{document}
  Hello world! This is \textit{italics} & it is great!
\end{document}
Let’s dive in!

- **amsmath**
  - Environments
  - Characters
  - Equations, numbering, and alignment

- **amssymb**
  - Special symbols

- **amsthm**
  - Theorems
  - Definitions
  - Proofs
  - And more!
Mathematics

\LaTeX\textup{unleashed}

Let’s dive in!

- \texttt{amsmath}
  - Environments
  - Characters
  - Equations, numbering, and alignment

- \texttt{amssymb}
  - Special symbols

- \texttt{amsthm}
  - Theorems
  - Definitions
  - Proofs
  - And more!
Let’s dive in!

- **amsmath**
  - Environments
  - Characters
  - Equations, numbering, and alignment

- **amssymb**
  - Special symbols

- **amsthm**
  - Theorems
  - Definitions
  - Proofs
  - And more!
Graphics
How To Add Graphics

- `\usepackage{graphicx}`
- `\begin{figure} \end{figure}`
- `\includegraphics[options]{picture.png}`
- Add a caption using the `\caption{caption here}` command.
- Alignment: `left, right, center, outer` and `inner`
- You can also make your own images using the Tikz package, but this is more advanced.
Graphics
How To Add Graphics

- \usepackage{graphicx}
- \begin{figure} \end{figure}
- \includegraphics[options]{picture.png}
- Add a caption using the \caption{caption here} command.
- Alignment: left, right, center, outer and inner
- You can also make your own images using the Tikz package, but this is more advanced.
Graphics

How To Add Graphics

\begin{itemize}
\item \texttt{\usepackage{graphicx}}
\item \texttt{\begin{figure} \end{figure}}
\item \texttt{\includegraphics[options]{picture.png}}
\item Add a caption using the \texttt{\caption{caption here}} command.
\item Alignment: \texttt{left}, \texttt{right}, \texttt{center}, \texttt{outer} and \texttt{inner}
\item You can also make your own images using the Tikz package, but this is more advanced.
\end{itemize}
Graphics

How To Add Graphics

- \usepackage{graphicx}
- \begin{figure} \end{figure}
- \includegraphics[options]{picture.png}
- Add a caption using the \caption{caption here} command.
- Alignment: left, right, center, outer and inner
- You can also make your own images using the Tikz package, but this is more advanced.
Graphics
How To Add Graphics

- `\usepackage{graphicx}`
- `\begin{figure} \end{figure}`
- `\includegraphics[options]{picture.png}`
- Add a caption using the `\caption{caption here}` command.
- Alignment: *left, right, center, outer and inner*
- You can also make your own images using the Tikz package, but this is more advanced.
Graphics
How To Add Graphics

- \usepackage{graphicx}
- \begin{figure} \end{figure}
- \includegraphics[options]{picture.png}
- Add a caption using the \caption{caption here} command.
- Alignment: left, right, center, outer and inner
- You can also make your own images using the Tikz package, but this is more advanced.
Tables

How To Add Graphics

- \texttt{\begin{table} \end{table}}
- \texttt{\begin{tabular}{ l | c c r} \end{tabular}}
- Using the & and \texttt{\hline} commands in a table
- Row spacing using \texttt{\renewcommand{\arraystretch}{1.5}}
- Adding a caption: \textit{Just like the graphicx package}
- Alignment: \textit{Just like the graphicx package}
Tables

How To Add Graphics

- \begin{table} \end{table}
- \begin{tabular}{ l | c c r} \end{tabular}
- Using the & and \hline commands in a table
- Row spacing using \renewcommand{\arraystretch}{1.5}
- Adding a caption: Just like the graphicx package
- Alignment: Just like the graphicx package
Tables

How To Add Graphics

- \begin{table} \end{table}
- \begin{tabular}{ l | c c r} \end{tabular}
- Using the \& and \hline commands in a table
- Row spacing using \renewcommand{\arraystretch}{1.5}
- Adding a caption: Just like the graphicx package
- Alignment: Just like the graphicx package
Tables

How To Add Graphics

• \begin{table} \end{table}
• \begin{tabular}{ l | c c r} \end{tabular}
• Using the & and \hline commands in a table
• Row spacing using \renewcommand{\arraystretch}{1.5}
• Adding a caption: Just like the graphicx package
• Alignment: Just like the graphicx package
Tables
How To Add Graphics

- \begin{table} \end{table}
- \begin{tabular}{ l | c c r} \end{tabular}
- Using the & and \hline commands in a table
- Row spacing using \renewcommand{\arraystretch}{1.5}
- Adding a caption: \textit{Just like the graphicx package}
- Alignment: \textit{Just like the graphicx package}
Tables
How To Add Graphics

• \begin{table} \end{table}
• \begin{tabular}{ l | c c r} \end{tabular}
• Using the & and \hline commands in a table
• Row spacing using \renewcommand{\arraystretch}{1.5}
• Adding a caption: Just like the graphicx package
• Alignment: Just like the graphicx package
Custom Commands
You Mean I Can Make It My Own

User Defined Commands

In \LaTeX, you have the power to create your own custom commands. These are shortcuts for doing certain tasks without having to write out the full length command. I.e. instead of typing \texttt{\textbackslash mathbb\{R\}} every time you want to add \( \mathbb{R} \) to your document, you can instead add a command in the preamble to do this with the command:

\texttt{\textbackslash R}
User Defined Commands

In LaTeX, you have the power to create your own custom commands. These are shortcuts for doing certain tasks without having to write out the full length command. i.e. instead of typing \mathbb{R}
every time you want to add R to your document, you can instead add a command in the preamble to do this with the command:

\R
Custom Commands
You Mean I Can Make It My Own

User Defined Commands

In \LaTeX, you have the power to create your own custom commands. These are shortcuts for doing certain tasks without having to write out the full length command. i.e. instead of typing \texttt{\textbackslash mathbb\{R\}} every time you want to add $\mathbb{R}$ to your document, you can instead add a command in the preamble to do this with the command: \\
\texttt{\textbackslash R}
You Mean I Can Make It My Own

User Defined Commands

In \LaTeX{}, you have the power to create your own custom commands. These are shortcuts for doing certain tasks without having to write out the full length command. i.e. instead of typing

\[ \text{\texttt{\textbackslash mathbb\{}R\texttt{\}} \]

every time you want to add \( \mathbb{R} \) to your document, you can instead add a command in the preamble to do this with the command:

\[ \text{\texttt{\textbackslash R}} \]
Bibliographies

Cite Your Sources

- Create a bibliography using \begin{thebibliography}{99}
- End using \end{thebibliography}
- Add bibliography items using \bibitem{label}
Resources for further learning