

# THIS IS AN INTRODUCTION TO LaTeX



Introduction to Latex

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University of Minnesota, November 7, 2016

# Outline

- Introduction
- Installation
- Getting Started
- Basic Commands
- Mathematics
- Graphics
- Tables
- User Defined Commands
- Bibliographies

# Introduction

## Why L<sup>A</sup>T<sub>E</sub>X?

- **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.

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# Introduction

## Word vs L<sup>A</sup>T<sub>E</sub>X

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

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

$$(x + a)^n = \sum_{k=0}^n \binom{n}{k}$$

$$A = \begin{bmatrix} a_{11} & \cdots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{n1} & \cdots & a_{nn} \end{bmatrix}$$

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# 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](https://overleaf.com) or [sharelatex.com](https://sharelatex.com).

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# Your First Document

## The basics

```
\documentclass{article}  
\begin{document}  
    Hello world!  
\end{document}
```

# Your First Document

A little more

```
\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}
```

# Caution

## Characters and Spaces

### 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}
```

In this document some extra packages were added. There are two packages and fontsize parameters have changed.

```
\end{document}
```

# Exercise

## More Advanced Document

Write a basic  $\text{\LaTeX}$  document with the following requirements

- Title your document “My First Proper  $\text{\LaTeX}$  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 `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 I

Don't Be Scared

Debug the following

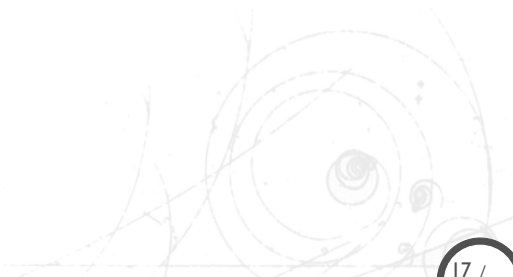
```
\documentclass{article}
\begin{document}
  Hello world! This is \mep{italics} & it is great!
\end{document}
```

# Mathematics

LaTeXunleashed

Let's dive in!

- `amsmath`
  - Environments
  - Characters
  - Equations, numbering, and alignment
- `amssymb`
  - Special symbols
- `amsthm`
  - Theorems
  - Definitions
  - Proofs
  - And more!

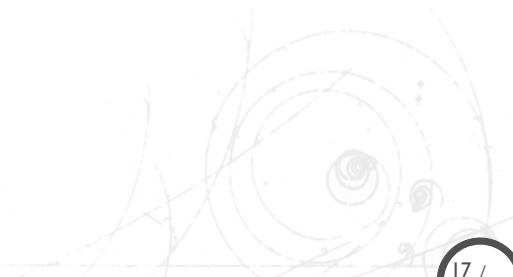


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# Graphics

## 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.

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- `\begin{tabular}{ l | c c r }`      `\end{tabular}`
- Using the `&` and `\hline` commands in a table
- Row spacing using `\renewcommand{\arraystretch}{1.5}`
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# Custom Commands

You Mean I Can Make It My Own

## User Defined Commands

In  $\text{\LaTeX}$ , 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  $\mathbb{R}$  to your document, you can instead add a command in the preamble to do this with the command:

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\R
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# 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

1. **Introduction** - Tobias Oetiker, The Not So Short Introduction to  $\text{\LaTeX}$  2 $\epsilon$ ,  
<https://tobi.oetiker.ch/lshort/lshort.pdf>.
2. **Tutorials/help** - <https://www.sharelatex.com>
3. **Tutorials/help** - <https://www.overleaf.com/latex/learn/free-online-introduction-to-latex-part-1#.VWB427vorJhF>
4. **Encyclopedia-like resource** -  
<https://en.wikibooks.org/wiki/LaTeX>
5. **Symbol lookup** - <http://detexify.kirelabs.org/classify.html>
6. **Math Symbol List** -  
<http://www.math.boun.edu.tr/instructors/gurel/symbols-a4.pdf>
7. **Templates** - <http://www.latextemplates.com/> or  
<https://www.sharelatex.com/templates>