

Intro to \LaTeX

Kenneth Cheng

Columbia University

March 4, 2013

What is \LaTeX ?

\LaTeX is a typesetting (think Microsoft Word) tool for:

- mathematical writing
- research papers
- books
- essays
- resumes
- forms
- presentations

\LaTeX takes plain text files and compiles them to PDFs.

Why \LaTeX ?

Why you should use \LaTeX .

- content vs. presentation
- plain text
- research and web presence
- looks nice!

Why you should NOT use \LaTeX .

- steep learning curve
- hard to install?

Hello World

```
\documentclass{article}
```

```
\begin{document}
```

```
Hello world!
```

```
\end{document}
```

Preamble

```
\documentclass{article}
\usepackage[margin=1in]{geometry}

\title{Intro to \LaTeX}
\author{Kenneth Cheng}
\date{March 4, 2013}

\begin{document}
\maketitle
Hello world!
\end{document}
```

Content vs. Presentation

L^AT_EX uses backslash for all commands and symbols.

```
\begin{equation}
  \frac{1}{2} \leq 1
\end{equation}
```

L^AT_EX treats whitespace similar to HTML.

- The quick brown fox jumps over the lazy dog.
- The quick brown fox jumps
over the lazy dog.

L^AT_EX supports comments!

```
This will show
% This won't show up in the PDF.
up in the PDF.
```

L^AT_EX organizes content on the:

- block level in environments.

```
\begin{itemize}
```

```
\item block level in environments.
```

```
\item inline level in commands.
```

```
\end{itemize}
```

- inline level in commands.

```
\section{Style Guide}
```

You can `\emph{italicize}` and `\textbf{bold}` fonts.

Math Mode

You can write math in math-supported environments.

- Equation

```
\begin{equation}
  \sum_{i=0}^n i = \frac{n(n+1)}{2}
\end{equation}
```

$$\sum_{i=0}^n i = \frac{n(n+1)}{2} \quad (1)$$

You can remove the numbering using the `equation*` environment.

- ```
\begin{equation*}
 \sin \alpha, \Gamma(z) = \int_0^\infty t^{z-1} e^{-t} dt
\end{equation*}
```

$$\sin \alpha, \Gamma(z) = \int_0^\infty t^{z-1} e^{-t} dt$$



# Math Mode

You can write math in math-supported environments.

- Align

```
\begin{align}
\sum_{i=0}^{n+1} i &= (n+1) + \sum_{i=0}^n i \\
&= (n+1) + \frac{n(n+1)}{2} \\
&= \frac{(n+2)(n+1)}{2}
\end{align}
```

$$\sum_{i=0}^{n+1} i = (n+1) + \sum_{i=0}^n i \quad (2)$$

$$= (n+1) + \frac{n(n+1)}{2} \quad (3)$$

$$= \frac{(n+2)(n+1)}{2} \quad (4)$$

# Math Mode

You can write math in math-supported environments.

- Inline `$$`

By induction, `\forall n \in \mathbb{N},`  
`\sum_{i=0}^n i = \frac{n(n+1)}{2}`.

By induction,  $\forall n \in \mathbb{N}, \sum_{i=0}^n i = \frac{n(n+1)}{2}$ .

Some symbols like  $\sum$  render differently inline.

- Add `\displaystyle`

By induction, `\displaystyle \forall n \in \mathbb{N},`  
`\sum_{i=0}^n i = \frac{n(n+1)}{2}`.

- or add it to your preamble.

```
\everymath{\displaystyle}
```

# Special characters

- `\$, \#, \%, \&, \~, \_, \^, \textbackslash, \{, \}`
- Use ‘‘quote’’ for quotations.

# A few symbols

[http://www.artofproblemsolving.com/Wiki/index.php/LaTeX:  
Symbols](http://www.artofproblemsolving.com/Wiki/index.php/LaTeX:Symbols)

# Tables

In math mode (for matrices):

- ```
\begin{equation*}
\left(
\begin{array}{ccc}
a & b & c \\
d & e & f \\
g & h & i
\end{array}
\right)
\end{equation*}
```

$$\begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix}$$

Tables

NOT in math mode:

- ```
\begin{tabular}{|l|c|}
 \hline
 operators & $F(t) = \mathcal{L}\{f(t)\}(s)$ \\ \hline
 vectors & $\mathbf{x} \cdot \hat{\mathbf{n}}$ \\ \hline
 common sets & $\mathbb{Z}, \mathbb{Q}, \mathbb{R}$ \\ \hline
\end{tabular}
```

|             |                                      |
|-------------|--------------------------------------|
| operators   | $F(t) = \mathcal{L}\{f(t)\}(s)$      |
| vectors     | $\mathbf{x} \cdot \hat{\mathbf{n}}$  |
| common sets | $\mathbb{Z}, \mathbb{Q}, \mathbb{R}$ |

TikZ is your graphics package for

- plots
- graphs and trees
- diagrams

<http://texample.net/tikz/examples/>

- <http://en.wikibooks.org/wiki/LaTeX>
- <http://www.artofproblemsolving.com/Wiki/index.php/LaTeX>
- <http://texample.net/tikz/examples/>
- <http://tex.stackexchange.com/>
- <http://www.ctan.org/>