Brief Introduction to LaTeX

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Text is simply typed in, extra spacing in plain text does not matter. Commands begin with backslash and affect curly-brace-enclosed areas. Comments start with %.

1 Basics

Set document style, title and author. Must enclose document with `\begin` and `\end`.

```
\documentclass[12pt]{article}

\begin{document}

\title{}
\author{}
\maketitle

% document starts here ...

\end{document}
```

Set margins and text height/width, these commands go before `\begin{document}` :

```
\setlength{\topmargin}{0in}
\setlength{\textheight}{8in}
\setlength{\oddsidemargin}{0in}
\setlength{\textwidth}{6.5in}
\setlength{\voffset}{-1in}
```

2 Sectioning

`\section{}`
`\subsection{}`
`\subsubsection{}`

3 Fonts

3.1 Style

- `\underline{LaTeX}` ⇒ <u>LaTeX</u>
- `{\em LaTeX}` ⇒ *LaTeX* `{\it LaTeX}` ⇒ *LaTeX*
- `{\sl LaTeX}` ⇒ *LaTeX*
- `{\bf LaTeX}` ⇒ **LaTeX**
- `{\tt LaTeX}` ⇒ `LaTeX`

3.2 Size

`{\tiny LaTeX}` ⇒ LaTeX
`{\scriptsize LaTeX}` ⇒ LaTeX
`{\footnotesize LaTeX}` ⇒ LaTeX
`{\small LaTeX}` ⇒ LaTeX
`{\normalsize LaTeX}` ⇒ LaTeX
`{\large LaTeX}` ⇒ LaTeX
`{\Large LaTeX}` ⇒ LaTeX
`{\LARGE LaTeX}` ⇒ LaTeX
`{\huge LaTeX}` ⇒ LaTeX
`{\Huge LaTeX}` ⇒ LaTeX

3.3 Symbols

3.3.1 Foreign Language Accents

`\~{o}` ⇒ õ `\‘{o}` ⇒ ò `\’{o}` ⇒ ó `\"{o}` ⇒ ö `\^{o}` ⇒ ô

3.4 Others

`\dag` ⇒ † `\S` ⇒ § `\pounds` ⇒ £ `\ae` ⇒ æ `\AA` ⇒ Å

4 Environments

LaTeX defines many convenient environments such as *itemize*, *enumerate*, *tabular*, *array* and *verbatim* etc. Please refer to manuals for detailed usage information on different environments.

```
\begin{itemize}
\item
% first item
\item
% second item
\end{itemize}
```

5 Images

1. Add this line to the beginning of your document before `\begin{document}` : `\usepackage{graphicx}`

2. Add the following lines to include an image called `cs340.png`, for example:

   ```
   \begin{figure}[h]
   \begin{center}
   \includegraphics[width=6in]{cs340.png}
   \end{center}
   \caption{A sample image for CS340}
   \end{figure}
   ```

   Note that `[width=6in]` is used to specify the final image width to 6 inches, which will scale the original image if it is a different size.

6 Math symbols and formulas

Must be in math mode. Math mode is switched on by `$ $` or `\[ \]` (display).

6.1 Subscripts and Superscripts

`$x^2$` $\Rightarrow x^2$	`$x^{2y}$` $\Rightarrow x^{2y}$	`$x^(2^{y})$` $\Rightarrow x^{2^y}$
`$x_2$` $\Rightarrow x_2$	`$x^{y_{1}}$` $\Rightarrow x^{y_1}$	`$x_{1}^{y}$` $\Rightarrow x_1^y$

6.2 Symbols

`$\alpha$` $\Rightarrow \alpha$	`$\theta$` $\Rightarrow \theta$	`$\phi$` $\Rightarrow \phi$
`$\Delta$` $\Rightarrow \Delta$	`$\Lambda$` $\Rightarrow \Lambda$	`$\Omega$` $\Rightarrow \Omega$
`$\cap$` $\Rightarrow \cap$	`$\bigtriangleup$` $\Rightarrow \triangle$	`$\div$` $\Rightarrow \div$
`$\triangleleft$` $\Rightarrow \triangleleft$	`$\oplus$` $\Rightarrow \oplus$	`$\leq$` $\Rightarrow \leq$
`$\succeq$` $\Rightarrow \succeq$	`$\equiv$` $\Rightarrow \equiv$	`$\approx$` $\Rightarrow \approx$
`$\supset$` $\Rightarrow \supset$	`$\in$` $\Rightarrow \in$	`$\leftarrow$` $\Rightarrow \leftarrow$
`$\Leftarrow$` $\Rightarrow \Leftarrow$	`$\leftrightarrow$` $\Rightarrow \leftrightarrow$	`$\Longleftarrow$` $\Rightarrow \Longleftarrow$
`$\nearrow$` $\Rightarrow \nearrow$	`$\uparrow$` $\Rightarrow \uparrow$	`$\infty$` $\Rightarrow \infty$
`$\forall$` $\Rightarrow \forall$	`$\spadesuit$` $\Rightarrow \spadesuit$	`$\sharp$` $\Rightarrow \sharp$

6.3 Formulae

Display is achieved with `\[ \]` and inline with `$ $` .

- `\[ x = \frac{y+\frac{z}{y-2}}{y^{2}+1} \]` $\Rightarrow$

$$x = \frac{y+\frac{z}{y-2}}{y^{2}+1}$$

- `\[ \sum_{i=1}^{n} x_{i} = \int_{0}^{1} f \]` $\Rightarrow$

$$\sum_{i=1}^{n} x_{i} = \int_{0}^{1} f$$

- `$ \sum_{i=1}^{n} x_{i} = \int_{0}^{1} f $` $\Rightarrow \sum_{i=1}^{n} x_{i} = \int_{0}^{1} f$
- `\[ \underbrace{a + \overbrace{b + \cdots + y}^{24} + z}_{26} \]` $\Rightarrow$

$$\underbrace{a + \overbrace{b + \cdots + y}^{24} + z}_{26}$$

- ```
  \[ \left( \begin{array}{c}
             \left| \begin{array}{cc}
                     x_{11} & x_{12} \\
                     x_{21} & x_{22}
                     \end{array}
              \right| \\
  ```
  ```

```
            y \\ z
            \end{array} \right) \]
```

⇒

$$\left(\begin{vmatrix} x_{11} & x_{12} \\ x_{21} & x_{22} \end{vmatrix} \right.$$
$$\left. \begin{array}{c} y \\ z \end{array} \right)$$

- ```
  \[ x = \left\{ \begin{array}{ll}
                 y & \mbox{if $y>0$} \\
                 z+y & \mbox{otherwise}
                 \end{array}
         \right. \]
  ```

  ⇒

$$x = \begin{cases} y & \text{if } y > 0 \\ z + y & \text{otherwise} \end{cases}$$

7 Special Characters

Certain characters are special because they appear in LaTeX commands. They are:

```
# $ % & ~ _ ^ \ { }
```

Seven of them `# $ % & _ { }` can be produced simply by escaping them with a `\` directly in front. The other three `~ ^ \` usually only appear in simulated keyboard input and must be produced using the *verbatim* environment.

- direct escape `\$` ⇒ $
- *verbatim*
  1. inline `\verb+~ ^ \+` ⇒ `~ ^ \`
  2. display

     ```
     \begin{verbatim}


     ~ ^ \

     \end{verbatim}
     ```
     ```

8 Running LaTeX

1. Save with extention .tex.
2. You can then process the saved text document say homework.tex with the command **pdflatex homework.tex** to generate a pdf document called homework.pdf.

9 Citations and Bibliography

1. Create a bibliography file (text file) with extension .bib. See an example bib file at ~dxu/handouts/cs340/example.bib.
2. In your main text, simply use `\cite{citationlabel}` whereever appropriate.

   Add these two lines to the end of your document before `\end{document}` :
   ```
   \bibliographystyle{alpha}
   \bibliography{nameofbibfilewithoutextension}
   ```
   See an example LaTeX file with citations at ~dxu/handouts/cs340/citation.tex.
3. Say your latex file is named homework.tex and your bib file is named mybibliography.bib.

   (a) Run LaTeX on homework.tex (**pdflatex homework.tex**) as usual, you will get warnings about references undefined, that is normal.

   (b) Run **bibtex homework**.

   (c) Then run LaTeX on homework.tex two more times. The third time LaTeX will run without warnings and all bib references will be properly incorporated.