\LaTeX introduction

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Outline

1. Why use \LaTeX?  

2. Basics

3. Typesetting Maths and Tables

4. Graphics

5. \LaTeX Editors
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Why use \LaTeX?  

What is \LaTeX? 

From Wikipedia

\LaTeX is a document markup language and document preparation system for the \TeX typesetting program

*layout design*: the authors write the contents, \LaTeX decides how to put it on a page.

Some examples...

\[ x = a_0 + \frac{1}{a_1 + \frac{1}{a_2 + \frac{1}{a_3 + a_4}}} \]
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- user’s only concern is the logical structure, not the appearance of a document (WYSIWYM vs WYSIWYG),
- complex structures like footnotes, table of contents, references can be generated easily,
- many add-on packages,
- highly portable and free. You can create documents from tex files in any platform,
- ...
Cons

Learning to use \LaTeX\ properly requires time...every time you need to do something new, you have to search the most appropriate solution.
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WYSIWYM

There are two ways to implement WYSIWYM systems,

**Interpreted** write a document containing markup commands, and see it using an interpreter (.html files),

```html
<!DOCTYPE html>
<html>
  <head>
    <title>Hello HTML</title>
  </head>
  <body>
    <p>Hello World!</p>
  </body>
</html>
```

**Compiled** write a document containing markup commands, and use a compiler to obtain a file that is in readable format (\LaTeX).

```
\$ latex example.tex \rightarrow \text{DVI}
\$ pdflatex example.tex \rightarrow \text{PDF}
```
A Minimal \LaTeX\ File

```
documentclass{article}
\begin{document}
Small is beautiful.
\end{document}
```

documentclass specifies the sort of document. Optional parameters customize the behavior of the standard classes.

```
documentclass[11pt,twoside,a4paper]{article}
```

The text that is between \texttt{begin} and \texttt{end} is the body of the document. The title of the whole document is generated by \texttt{\maketitle}. The content of the title has to be specified by the commands \texttt{\title{..}}, \texttt{\author{..}}, and optionally \texttt{\date{..}}.
Document Structure

Paragraphs are created using empty lines between text parts.

Document should be organized in chapters, sections, and subsections, using the special commands

\section{...}
\subsection{...}
\subsubsection{...}
\paragraph{...}
\subparagraph{...}
commands starts with a \, some requires parameters between \{\}, and optional parameters between [],

spaces consecutive spaces are treated as one space,

specials # $ % ^ & _ { } ~ \ are reserved, you can write them as commands, \# \$ \% \^{} \& \_ \{ \} \~{} \textbackslash,

comments when \LaTeX\ encounters a %, it ignores the rest of the present line,

packages .sty files containing additional packages can be included with the command \usepackage{file.sty} after the documentclass header.
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The **amsmath** Package

To typeset advanced mathematics, use the package **amsmath**.

- **text style** within paragraphs, $a^2 + b^2 = c^2$ becomes $a^2 + b^2 = c^2$
- **display style** separate from paragraphs, \(a^2 + b^2 = c^2\) becomes

\[a^2 + b^2 = c^2\]
Blocks of a Mathematical Formula

Greek

\[ \lambda, \xi, \pi, \theta, \mu, \Phi, \Omega, \Delta \]

Exponents

\[ p_{ij} \quad m_{Knuth} \quad \sum_{k=1}^{3} k \quad [5pt] \]
\[ a^x + y \quad \neq \quad a^{x+y} \quad e^{x^2} \neq e^{x^2} \]

Square Root

\[ \sqrt{x} \iff x^{1/2} \quad \sqrt{2} \quad \sqrt{x^2 + y} \quad \sqrt{[x^2 + y^2]} \]

Variables

\[ f(x) = x^2 \quad \hat{XY} \quad \bar{x}_0 \quad \bar{x}_0 \]
Theorems, Lemmas and Definitions

Declare them in the preamble by using the command

\newtheorem{name}{longname}

\textit{name} argument is a short keyword to identify the “theorem”. \textit{longname} is the actual name of the “theorem”, which will be printed in the final document.

\begin{name}[text]
This is my interesting theorem
\end{name}

\begin{proof}
Trivial, use
\begin{equation*}
E=mc^2.
\end{equation*}
\end{proof}

\textbf{LaTeX 1 (sample theorem).} This is my interesting theorem

Proof. Trivial, use

\begin{equation*}
E = mc^2.
\end{equation*}
Tables

The **tabular** environment to typeset tables. \LaTeX{} determines the width of the columns automatically, and does not wrap the text.

\begin{tabular}{|r|l|}
\hline
7C0 & hexadecimal \\
3700 & octal \\
1111000000 & binary \\
\hline
\end{tabular}

\begin{tabular}{|p{4.7cm}|}
\hline
Welcome to Boxy’s paragraph. We sincerely hope you’ll all enjoy the show. \\
\hline
\end{tabular}

- \textit{r, l, c} respectively right, left, centered alignment of text,
- | a vertical line,
- \textit{p{..}} fixed width column with justified text.
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Importing Graphics

Use the `graphicx` package,

\usepackage{graphicx}

then the command

\includegraphics[key=...]{file}

to include the `file` in your document. Optionals are

- `width` scale graphic to the specified width
- `height` scale graphic to the specified height
- `angle` rotate graphic counterclockwise
- `scale` scale graphic

**Note**

Using the `latex` compiler you can only import .eps graphics. Using `pdflatex`, you can import also .jpg, .png, and .pdf
You can also draw in using the `picture` environment,

\begin{tikzpicture}[scale=0.8]
  \tikzstyle{v}=[circle, minimum size=2mm, inner sep=0pt, draw]
  \foreach \i in {1,...,8}
    \foreach \j in {1,...,3}
      \node[v]
        (G-\i-\j) at (\i,\j) {};
  \foreach \i in {1,...,8}
    \foreach \j/\o in {1/2,2/3}
      \draw[->]
        (G-\i-\j) -- (G-\i-\o);
  \foreach \i/\n in
    {1/2,2/3,3/4,4/5,5/6,6/7,7/8}
    \foreach \j/\o in {1/2,2/3} {
      \draw[->] (G-\i-\j) -- (G-\n-\o);
      \draw[->] (G-\n-\j) -- (G-\i-\o);
    }
\end{tikzpicture}
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Dedicated \LaTeX\ Editors

More useful than plain text editors, usually have autocompletion, spell and error checking, and handy macros.

**Kile** for the KDE http://kile.sourceforge.net/

**Gedit** for Gnome

http://www.michaels-website.de/gedit-latex-plugin/

**TEXnicCenter** windows http://www.texniccenter.org/

**TEXShop** Mac Os X http://pages.uoregon.edu/koch/texshop/

**Texmaker** cross-platform http://www.xm1math.net/texmaker/
WYSIWYG Editors

Compile and show the resulting output of \LaTeX{} commands.

\texttt{LyX} cross-platform \url{http://www.lyx.org/}

\texttt{BaKoMaTex} windows \url{http://bakoma-tex.com/menu/about.php}