INTRODUCTION TO LaTeX

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Outlines

- **Introduction**
- **Document Structure**
- **Text Formatting**
- **Graphics**
- **Table and Array**
- **Mathematical Typesetting**
- **Bibliography**

Introduction

- **What is LaTeX?**
- **Why LaTeX?**
- **What is TeXworks?**
- **Installation**

What is LaTeX?

- **LaTeXis a typesetting program**
- **Its designed to produce publication-quality typeset documents**
- **Extension of the original program TEX written by Donald Knuth**
- **Difference between word processors and LaTeX**

Why LaTeX?

- **Create beautifully typeset technical documents**
- **Use of already formated document type**
- **Create documents containing lot of mathematics**
- **Same file run on all platform**

What is TeXworks?

- **Text editor for LaTeXto create documents with LaTeX**
- **It convert to PDF**

Installation

- **MiKTeX (Bundle) (Windows)**
- **Texniccenter (Editor) (Windows)**
- **Mactex (Bundle) (Mac)**
- **Texlive (Bundle) (Linux)**
- **Lyx (Bundle & Editor) (Windows, Mac, Linux)**
- **Texmaker (Windows, Mac, Linux)**
- **WriteLaTeX (Collaborative Online Editor)**

Document Structure

- **Required Components of a LaTeX Document**
- **Document Classes**
- **Packages**
- **Page Style**
- **Font Style**
- **Parts of a Document**

Required Components of a LaTeX Document

Every LaTeX document must contain the following three components. Everything else is optional even text

1. **\documentclass[options]{class}**
2. **\begin{document}**
3. **\end{document}**

Document Classes

The following classes are distributed with LaTeX:

- **\documentclass{article}**
- **\documentclass{letter}**
- **\documentclass{report}**
- **\documentclass{beamer}**
- **\documentclass{book}**
- **\documentclass{slides}**

Document Class Options

Following options are available with document class:

1. **Font Size**
   10pt, 11pt, 12pt
2. **Paper Size**
   letterpaper, a4paper, legalpaper, etc.
3. **Page Formats**
   onecolumn, twocolumn

Packages

Additional structures are defined by packages. The standard packages include:

- **\usepackage{graphicx}**
- **\usepackage{amsmath}**
- **\usepackage{cite}**
- **\usepackage{latexsym}**
- **\usepackage{makeidx}**

Page Style

- **\pagestyle{plain}**
  Which puts the page number at the center of the bottom of the page and provides no headings
- **\pagestyle{empty}**
  Provides neither page numbers nor headings
- **\pagestyle{headings}**
  Provide page numbers and headings from any sections that you are using
- **\pagestyle{myheadings}**
  Provide page numbers and custom headings

Font Style

1. **Font Shape**
   - \textit{italics text}
   - \textsl{slanted text}
   - \textsc{small caps text}
   - \textup{upright}
2. **Font Weight**
   - \textmd{medium weight}
   - \textbf{boldface weight}
3. **Font Types**
   - \textrm{Roman family}
   - \textsf{Sans serif family}
   - \texttt{Typewriter\teletype family}

Parts of a Document

Documents (especially longer ones) are divided into chapters, sections and so on.

- **Title**
- **Table of Contents**
- **List of Figures**
- **List of Tables**
- **Abstract**

Text Formatting

- **Text Positioning**
- **Bulleted Lists**
- **Numbered Lists**

Text Positioning

- **Center - For centering text**
- **Flushleft - Flush text to left**
- **Flushright - Flush text to right**

Bulleted Lists

To create a bulleted list, surround the information with a

\begin{itemize}
\item .....
\item .....
\end{itemize}

Numbered Lists

To create a numbered list, surround the information with a

\begin{enumerate}
\item .....
\item .....
\end{enumerate}

Including Graphics

- **Including Graphics Within Your Document**
  \includegraphics{graphics file}
- **use package \usepackage{graphicx}**
- **You can also specify the height and width:**
  \includegraphics[height= 2in, width = 3in]{graphics file}

Including Graphics Within Your Document

```
\begin{figure}[figure location]
\centering
\includegraphics{file name}
\caption{title of figure}
\end{figure}
```

Figure Location Arguments

Optional argument which allows users to specify possible figure locations:

- **h (Place the figure in the text where the gure command is located)**
- **t (Place the figure at the top of the page)**
- **b (Place the figure at the bottom of a page)**
- **p (Place the figure on a page containing only oats)**
- **If no optional arguments are given, the placement options default to [tbp]**

Tables and Arrays

- **Constructing Arrays**
- **Constructing Tables**

Constructing Arrays

To construct a array use syntex:
\begin{array}{justification}
.....
\end{array}

The justication should consist of

- **'l' for left justication**
- **'c' for centered justication**
- **'r' for right justication**

Constructing Tables

To construct a table use syntex:
\begin{tabular}{justification}
.....
\end{tabular}

The justication should consist of

- **'l' for left justication**
- **'c' for centered justication**
- **'r' for right justication**

Mathematical Typesetting

There are two ways to insert mathematical formulas

- **One is to have it appear in a paragraph with text.**
- **The other way is to have them appear in a separate paragraph.**

Mathematical Formulas

- **Exponents and Subscripts**
- **Above and Below**
- **Sums and Integrals**
- **Limits**
- **Multi-line Equations**
- **Text in Math**

Exponents and Subscripts

- **Use the '^'character (shift + 6), known as a caret, to create exponents**
- **If you have an exponent containing more than one character, group the exponent characters inside braces**
- **Similarly, subscripts are created using the (underscore character)**

Above and Below

- **It is useful to be able to draw horizontal lines and braces above and below parts of a formula**
- **\overline**
- **\overbrace**
- **\underline**
- **\underbrace**

Sums and Integrals

```
$$
\sum_{k=0}^\infty \frac{(-1)^k}{k+1} = \int_0^1
\frac{dx}{1+x}
$$
```

produce

$$\sum_{k=0}^{\infty} \frac{(-1)^k}{k+1} = \int_0^1 \frac{dx}{1+x}$$

Limits

```
$$
\lim_{x\rightarrow 0} \frac{\sin x}{x} = 1
$$
```

produce

$$\lim_{x\rightarrow 0} \frac{\sin x}{x} = 1$$

Multi-line Equations

```
\begin{align*}
(a+b)^2 &= (a+b)(a+b)\\
&= a^2+ab+ba+b^\\
&= a^2+2ab+b^2
\end{align*}
```

produce

$$\begin{aligned}(a+b)^2 &= (a+b)(a+b)\\ &= a^2+ab+ba+b^2\\ &= a^2+2ab+b^2\end{aligned}$$

Text in Math

$$
\int_0^{2\pi}\cos(mx)\,dx = 0 \hspace{1cm}
\mbox{if and only if} \hspace{1cm} m \ne 0
$$

produces

$$\int_0^{2\pi} \cos(mx)\, dx = 0 \qquad \textbf{if and only if} \qquad m \neq 0$$

Bibliography

Bibliography is the environment which helps the author to cross-reference one publication from the list of sources at the end of the document. LaTeXhelps authors to write a well structured bibliography.

thebibliography Environment

To produce bibliography, one has to use

\begin{thebibliography}{widest-label}
\bibitem{key1}
\bibitem{key2}
\end{thebibliography}