An Introduction to LaTeX for Beginners

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Outline

Document Specifications

This is the first line in the .tex file.
Here one has to specify the following:

- documentclass: report,article,beamer,letter,exam etc.
- papersize: a4paper etc.
- font size: 10pt,11pt,12pt.
- Some other attributes, such as- answer, twocolumn etc.

The command is:
\documentclass[11pt,a4paper,answers]{exam}

For advanced users: You may visit Class vs Packages

Packages & their Attributes

While writing a document, we often need many symbols, signs,characters etc.
Then there are colors,references,hyperlinks etc.
Sometimes one may need to include figures as well.
All these things can be done with packages.
Here is a list of some of them:

- AMS Packages: amsmath,amsfonts,amssymb,amsthm,amsrefs etc.
- Other commonly used ones: mathrsfs,graphics,xcolor,epsfig,tikz etc.
- For specific purposes: framed, ragged2e, gensymb (for degree,currency symbols), textcomp etc.

The usual command is:
\usepackage{amsmath,graphicx,xcolor,tikz}

Themes: Beamertheme, Fonttheme, Colortheme

This is specifically for Beamers/Presentations.
The usual set of commands are:

```
\usetheme{warsaw}
\usecolortheme{rose}
\setbeamercolor{font}{fg=black!90!cyan}
\usefonttheme{serif}
```

Other examples of beamerthemes, colorthemes and fontthemes can easily be found online.

LaTeX Environments

In mathematical documents, we often need environments like Theorem, Lemma, Example, Corollary etc. Here is how to define them.

```
\theoremstyle{plain}
\newtheorem{theorem}{Theorem}[section]
\theoremstyle{remark}
\newtheorem{remark}[theorem]{Remark}
```

and they are used like

```
\begin{theorem}
A subset of $\mathbb{R}$ is compact iff it is closed and bounded.
\end{theorem}
```

Details

This is the last part of the preamble of the latex document.
Here one has to provide the details of the document, such as-

Types		Examples		Commands
Title	:	LaTeX How To's	-	\title{\LaTeX How To's}
Author	:	Mr. XYZ	-	\author{Mr. XYZ}
Institute	:	Institute Name	-	\institute{ABC Institute}
Date	:	September 2016	-	\date{September 2016}

etc.

Title Page

This can be done in two ways:

- Method 1: If document details are already in the preamble.
  For articles,reports etc.
  \titlepage { \maketitle }
  For beamers
  \frame { \maketitle }
- Method 2: Manually design your title page title.tex.
  Then use
  For articles,reports etc.
  \titlepage { title.tex }
  For beamers
  \frame { title.tex }

Table of Contents

This is an essential part of most documents.
(Might not be required for short documents like assignments, short articles etc.)

The usual command is:

\tableofcontents	Normal TOC.
or	
\tableofcontents[hideallsubsections]	TOC without the subsections.

It is recommended to use
\clearpage
after the "Table of Contents" in reports, articles etc.
In beamer, it is automatic.
Similar: \listoftables, \listoffigures

Abstract

This part is essential specially for project reports & scientific articles.

The usual command is:
\begin{ abstract }
The main aim of this report ...
\end{ abstract }

One can also manually design this page according to his/her convenience.

Page Numbering

This is the part where the page numbering styles are specified.
Few of such numbering styles are : arabic, roman, gobble etc.
For more, visit SHARELATEX.

Style		Example
Arabic	:	1,2,3,...
Roman	:	i, ii, iii, ...
Gobble	:	No Numbering

The usual command is:

```
\pagenumbering{arabic}
\setcounter{page}{4}
```

The setcounter command allows to continue numbering starting from a specific page-number.
In the above example, it will start counting from the section containing the command and continue like 4,5,6, ...

Chapters, Sections, Subsections

This part is required mainly in Reports, articles etc.
In Beamers, these are suppressed to some extent. They are only required there to create the TOC...

The usual command is:

Numbered		Not numbered
\chapter{Chapter Name }	:	\chapter*{Chapter Name }
\section{Section Name }	:	\section*{Section Name }
\subsection{Subsection Name }	:	\subsection*{Subsection Name }

etc.

Font Attributes

Inside the document, one can also customize font-style, color etc. The following table represents the same:

Attribute	Command	Output
None	This is default.	This is default.
Color	{\color{red} This is red.}	This is red.
Size	{\large This is large.}	This is large.
Style	$\mathbb{N}$: Natural numbers.	$\mathbb{N}$: Natural numbers.

For more, visit SHARELATEX.

Math Mode

This will be frequently needed in writing Mathematical documents. The key things are,

- You have to always write the expressions within pair of $-(dollar) symbols, like

INPUT		OUTPUT
$ \sin (x) $	:	$\sin(x)$

- One can also write them in some other ways, with some default central alignments:

Math Mode		Command
Type 1	:	$$ \sin (x) $$
Type 2	:	\[\sin (x) \]

For more, visit SHARELATEX.

Equations & Equationarray

EQUATIONS: There are two types of equations (in terms of numbering): Numbered, Non-numbered.

Type	Command	Output
Numbered :	\begin{equation} ax+by=5. \end{equation}	$ax + by = 5.$ (1)
Non-numbered :	\begin{equation*} ax+by=5. \end{equation*}	$ax + by = 5.$
	$$ ax+by=5.$$	$ax + by = 5.$
	\begin{equation} ax+by=5. \nonumber \end{equation}	$ax + by = 5.$

Equations & Equationarray ...

EQUATION ARRAY: When we need a collection of aligned equations, we use Equation array.
Commands:

- \begin{eqnarray}
  y &= & f(x) + g(-x), (g is odd function)
  & = & f(x) - g(x)
  ⋮ …
  \end{eqnarray}

Example:

$$\begin{aligned} y &= f(x) + g(-x), \quad \text{(g is odd function)} && (1)\\ &= f(x) - g(x) && (2) \end{aligned}$$

If none of the equations is numbered, then replace eqnarray by eqnarray*. Otherwise, put \nonumber in the lines without numbering.

Bibliography

This is an essential part of any scientific document.
There are many formats possible. But essentially they are of two types:

- Create a separate .bib file and include in the main document.
- Write the bibliography within the main document.

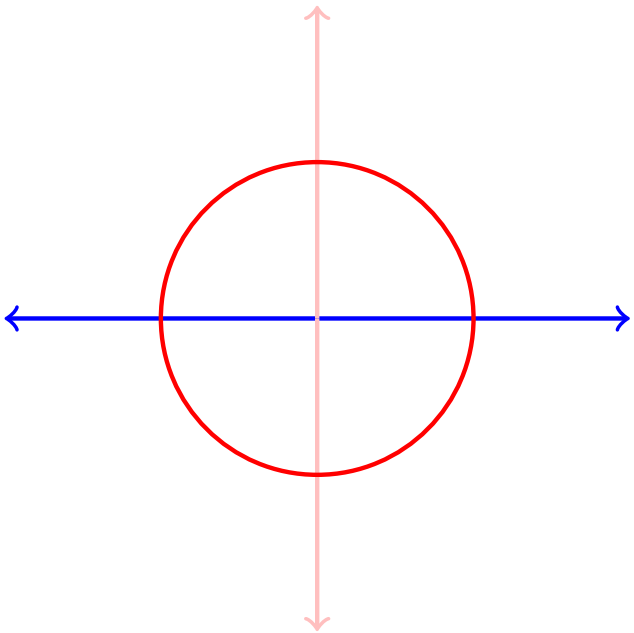
Commands:
\bibliographystyle{stylename}
\bibliography{bibfile}

Commonly used style - plain.

To know more, click here.

Tikz

This allows one to draw shapes and figures according to their requirements.



The code is:

```
\begin{tikzpicture}
\draw[thick,blue,->] (0,0) - - (-2,0);
\draw[thick,blue,->] (0,0) - - (2,0);
\draw[thick,pink,->] (0,0) - - (0,-2);
\draw[thick,pink,->] (0,0) - - (0,2);
\draw[thick,red] (0,0) circle(1cm);
\end{tikzpicture}
```

For more, visit TIKZ.

Document Ornamentations

This topic is mainly for customizing Reports, Articles etc. One can customize the layout of the pages of his/her own documents.
Those things can be covered at later stages.

An equivalent idea in case of beamers is slide transitions. For the time being we leave that too. If needed, one can see PowerDots.

THANK YOU