LaTeX Workshop

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Outline of the Workshop

- Introduction to LaTeX

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- Introduction to LaTeX
- Document structure

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- Document classes and packages

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- Environments

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- Document classes and packages
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- Exercises

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- Has collection of defined commands to create names and numbers for title, section, etc.
- AMS-TeX was a collection of extensions to TeX with more advanced mathematical typesetting features.
- LaTeX 2_ε is the latest version of LaTeX in use.

Document Structure

- LaTeX document is a plain text file with required commands and environments.
- The extension of the file is `.tex`
- All commands start with a '\'. Eg., `\caption`, `\label`, etc.
- A LaTeX document starts with a declaration of the document type by `\documentclass{}`
- The matter to type set are typed between `\begin{document}` *the content* `\end{document}`

Document Structure (Cont..)

- LaTeX documents are classified into *article*, *report*, *book*, etc.

A typical document can be;

```
\documentclass{article}

\begin{document}

content...

\end{document}
```

Practice: *Create a sample document*

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  Do: → `pdflatex file.dvi` and get; `.pdf` file

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Practice: *Compile the sample document*

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- Different document classes are:
  - `article`: To typeset articles for journals, conferences, etc.
  - `report`: To typeset reports of any form
  - `book`: To typeset a book

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```
\documentclass[12pt,a4paper,twocolumn]{article}
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```

Practice: *Use the arguments in your sample document and see the changes*

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- Packages are included to support different functionalities:
  To get mathematical symbols, functions, etc., to include a figure in the document, to change a default font, and so on....

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Eg:

```
\documentclass[12pt,a4paper]{article}
\usepackage{amsmath,amssymb,amsfonts}
\usepackage{times,natbib,graphicx}
\begin{document}
matter
\end{document}
```

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- `times` change the font to Times Roman.
  `natbib` allows author year type of citations similar to ‘Disney *et al.* (2003)’, etc.,
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Practice: *Use the* `times` *package in your sample document and see the changes*

Before the Body of Document

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- `\title{Your Title}` will assign a title for the document.

Before the Body of Document

A document will have:

- Title of the document,
- Name(s) of the author(s), and
- Affiliation, date of creation etc., (optional)
- `\author{Your Name(s)}` will assign the name(s) of author(s) to the document.

Before the Body of Document

A document will have:

- Title of the document,
- Name(s) of the author(s), and
- Affiliation, date of creation etc., (optional)
- `\date{any date}` will assign a date to the document. If kept blank, no date will be assigned.

Before the Body of Document

A document will have:

- Title of the document,
- Name(s) of the author(s), and
- Affiliation, date of creation etc., (optional)
- Use all of them before `\begin{document}` in your document

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Practice: *Compile document and check what happens.*

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Practice: *Prepare Table of contents in your document*

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- Use `\section{section name}`, `\subsection{subsection name}`, etc.

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- Sections, subsections, sub-subsections etc.
- Mathematical symbols and formulae in line with the text. $ $ can provide in line math environment
- Eg: `A straight line equation is $ y=ax+b $.` will produce;
  'A straight line equation is $y = ax + b$.' in the compiled document

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Eg: `The detailed descriptions are provided in Section \ref{section-label}.`

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Practice: *Use label for a section in your sample document and cross refer to it in the body in some other section.*

Environments:- Equations

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- Equation
- A single equation is typeset between `\begin{equation}` and `\end{equation}`. It will assign a number to the equation. Assign a ‘label’ to the equation and refer it anywhere.

Environments:- Equations

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- Equation
- A single equation can also be typeset between $$ and $$. No equation number will be created and no labelling possible.

Environments:- Equations

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- Equation

- ```
  \begin{equation}
  f=ma \label {eq1}
  \end{equation}
  Equation \ref{eq1} can be used to find out the force exerted
  by a body of mass $ m $ moving with acceleration $ a $.
  ```
  will produce:

$$f = ma. \tag{1}$$

Equation 1 can be used to find out the force exerted by a body of mass m moving with an acceleration a.
  ```

Environments:- Equations

The environments in a LaTeX document are; equations, tables, arrays, lists, figures,

- Equation

- ```
  \begin{eqnarray}
  \varphi=\sqrt[10]{\frac{a}{b}} \label {eq1}\\
  \lim_{x \rightarrow 0} \frac{\sin x}{x} = 1 \label{eq3}
  \end{eqnarray}
  ```
  Will produce:

$$\varphi = \sqrt[10]{\frac{a}{b}} \tag{2}$$

$$\lim_{x \to 0} \frac{\sin x}{x} = 1 \tag{3}$$
  ```

Environments:- Arrays

Arrays are created using
`\begin{array}{justification}`
and
`\end{array}`

`{justification}` possible for array elements are:

`{l}`:- for left aligned column
`{c}`:- for centre aligned column
`{r}`:- for right aligned column

Environments:- Arrays

```
$$
\left(
\begin{array}{ r c l}
\alpha_i & \beta & \gamma\\
a&ab&abcd \\
1&123&3 \\
\end{array}
\right)
$$
```

Will Produce:

$$\left(\begin{array}{ r c l} \Gamma\alpha_i & \beta & \gamma \\ a & ab & abcd \\ 1 & 123 & 3 \end{array} \right)$$

Environments:- Tables

Tables are created using
`\begin{table}[position]`

and

```
\caption{table caption }\label{table-label}
```

`\end{table}`

`[position]` possible for tables are:

`[h]`:- for position exactly at this place (here)
`[t]`:- for top of the page in which the table comes
`[b]`:- for bottom of the page in which the table comes
Usually `\tabular` environment is used to define the column alignments

Environments:- Tables

```
\begin{table}
\begin{tabular}{|r|l|c|}
\hline Roll No.  & Name & Grade \\
\hline 0123 & Radha & AA \\
\hline 0124 & Radhika & AB \\\hline
\end{tabular}
\caption{First Table}\label{first-table}
\end{table}
```

Will Produce:

Roll No.	Name	Grade
0123	Radha	AA
0124	Radhika	AB

Table 1: First Table


```
\begin{table} \centering
\begin{tabular}{|r|l|c|}
\hline Roll No.  & Name & Grade \\
\hline 0125 & Anu & AB \\
\hline 0126 & Vinu & BB \\\hline
\end{tabular}
\caption{First Table}\label{first-table}
\end{table}
```

Will Produce:

Roll No.	Name	Grade
0125	Anu	AB
0126	Vinu	BB

Table 2: Second Table

Environments:- Lists

Lists are basically; Enumerated List, Bullet List, and Description

Enumerated Lists are created by

```
\begin{enumerate}
\item First item in list
\item Second item in list
\end{enumerate}
```

Environments:- Lists

Lists are basically; Enumerated List, Bullet List, and Description

Enumerated List

```
\begin{enumerate}
\item First item in List
\item Second item in List
\end{enumerate}
```

Will Produce:

1. First item in List
2. Second item in List

Environments:- Lists

Lists are basically; Enumerated List, Bullet List, and Description

Bullet List

```
\begin{itemize}
\item First item in List
\item Second item in List
\end{itemize}
```

Will Produce:

- First item in List
- Second item in List

Environments:- Lists

Lists are basically; Enumerated List, Bullet List, and Description

Description List

```
\begin{description}
\item[IEOR] Industrial Engineering and Operations Research (IEOR)
at IIT Bombay.
\item[IDC] Industrial Design Centre (IDC) at the Indian Institute
of Technology Bombay.
\end{description}
```

Will Produce:

IEOR Industrial Engineering and Operations Research (IEOR) at IIT Bombay.

IDC Industrial Design Centre (IDC) at the Indian Institute of Technology Bombay.

Environments:- Figures

Figures can be inserted with the `graphics` package included in the preamble.

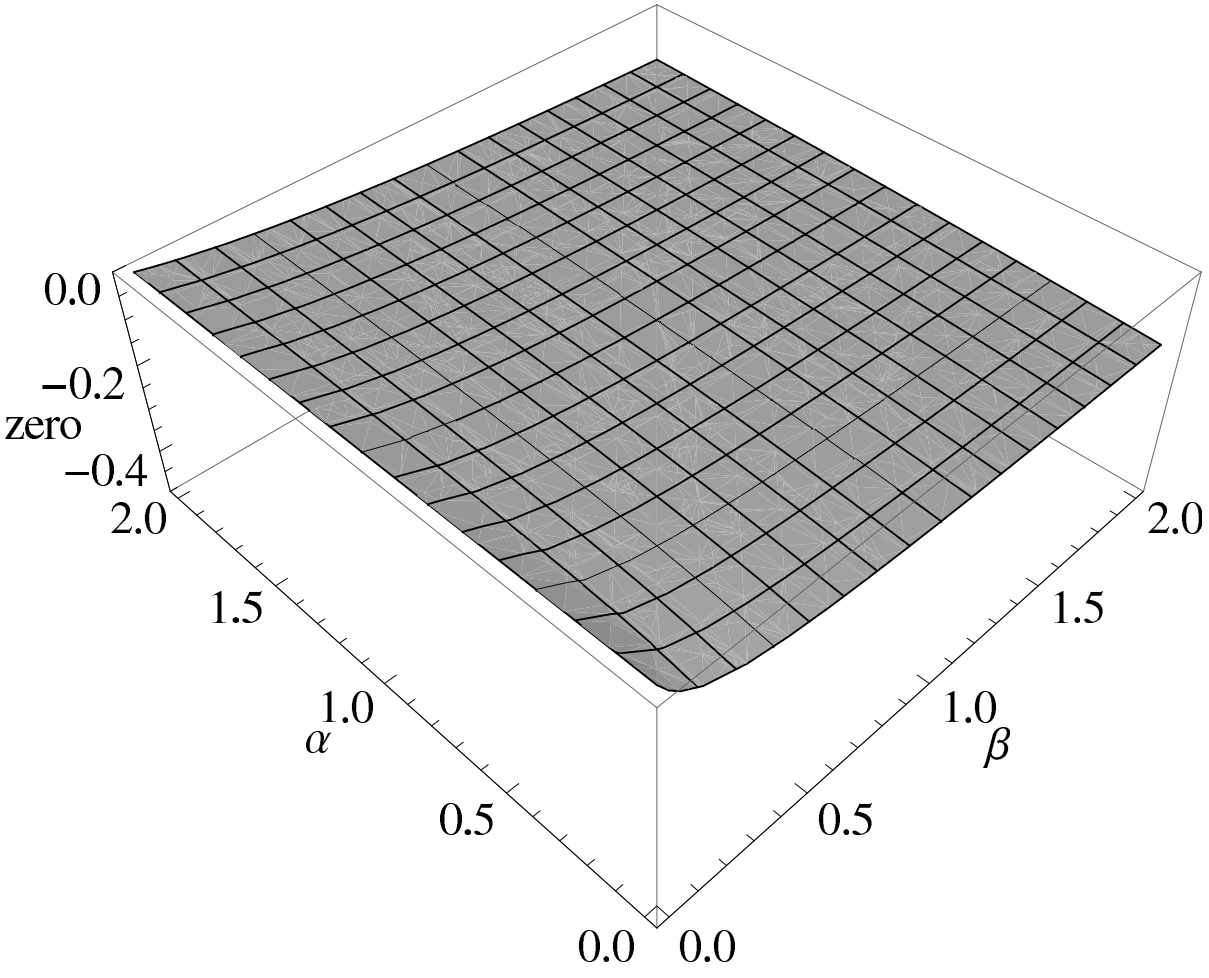
Figures are included by

```
\begin{figure}[position] \centering
\includegrapics[size]{figure file name}
\caption{figure caption}\label{figure-label}
\end{figure}
```

Eg.

```
\begin{figure}[h]\centering
\includegraphics[width=3in]{fig1.eps}
\caption{First Figure}\label{first-figure}
\end{figure}
```

Will produce:



Environments:- Figures

Figure 1: First Figure

Environments:- Tabbing

Tabbing sets Tab positions in a line and the following lines follow these tab positions. Tab separation is done by '\=' . These tab positions are used by '\>'

E.g.

```
\begin{tabbing}
 Program\quad \= : \= \TeX\\ [5pt]
 Author       \> : \> Donald Knuth\\[5pt]
 Manuals      \> :\\
\end{tabbing}
```

Will produce:

Program : TEX

Author : Donald Knuth

Manuals :

Tabbing- (Contd..)

Another example

```
\begin{tabbing}
Book Title \hspace{2cm} \= Author \hspace{2cm}  \= Year\\ [5pt]
Stochastic Process      \> S. M. Ross  \> 2007\\[5pt]
Linear Programming \> Robert J. Vanderbei \> 2008
\end{tabbing}
```

Will produce:

Book Title	Author	Year
Stochastic Process	S. M. Ross	2007
Linear Programming	Robert J. Vanderbei	2008

Linespacing in a file

Line spacing in a file can be globally be fixed to single space, one and half space, or double space, by declaring the base line stretch

'`\renewcommand{\baselinestretch}{1.5}`' used before '`\begin{document}`' will change the linespacing in the entire document to one half space.

A cleaner way is to use the package '`setspace`'

This will allow changing the line spacing from any point in the document onwards.
Commands used are:
'`\singlespace`' : for single space
'`\onehalfspace`' : for one and half space space
'`\doublespace`' : for double space

Citations in a document

Citations can be inserted either by using a bibliography file (‘`.bib`’) and using the labels to cite or by using ‘`\bibitem{citekey}...contents...`’ and use the citekey within the same document.

Better follow the ‘`.bib`’ file and a *style* to cite.

```
\small
@BOOK{Axsater,
  title = {{Inventory} {Control}},
  publisher = {Kluwer Academic Publishers},
  year = {2000},
  author = {Sven Axs\"{a}ter}
}
 @Article{DMTCS,
    author = {Csaba Schneider},
    title = {Computing nilpotent quotients in finitely presented
    {L}ie rings},
   journal = {Discrete Mathematics and Theoretical Computer Science},
   year = 1997,
   volume = {1},
   number = {1},
   pages = {1-16},
```

Use Citations

Citations can be inserted in the appropriate space by using '`\cite{key}`' or '`\cite{keylist}`' (for more citations)

A `.bib` file will have entries like

```
Searching is a topic which is under active development: the
CTAN  team hope to be able shortly to provide significant
new tools \cite{Axsater}

\bibliography{sample}
\bibliographystyle{plain}
```

can produce

References

Axsäter, S., 2000. *Inventory Control*. Kluwer Academic Publishers.

To change name for References Section and Styles

The title for thr references section can be changed to any thing by using '`\renewcommand\refname{required name}`' after the beginning of the document.

To get `Author(year)` type citations, use the package `natbib`.

then use citations by `\citet{key}` or `\citep{key}`
`\citet` will produce → Axsäter (2000)

`\citep` will produce → (Axsäter 2000)

Beamer Presentations

```
\documentclass{beamer}
\usetheme{Singapore}
\title{Example Presentation Created with the Beamer Package}
\author{Bijulal D.}
\date{\today}
\begin{document}
\frame{\titlepage}
\section[Outline]{}
\frame{\tableofcontents}
\section{Introduction}
\subsection{Overview of the Beamer Class}
\frame{  \frametitle{Features of the Beamer Class}
  \begin{itemize}
  \item<1-> Normal LaTeX class.
  \item<2-> Easy overlays.
  \item<3-> No external programs needed.
  \end{itemize} }
\end{document}
```

To be continued...