CS Essentials

Session 4: LaTeX Essentials 2

Feedback forms:

Feedback form on Google
https://goo.gl/forms/l2Nd2uNJXoQf8gT52

First Part: Summary

What is LaTeX?

Is it a **word processor**?

NO! LaTeX encourages *content* and not *design*.

You can think of it as a programming language, whose purpose is to typeset a document.

Do not confuse TeX and LaTeX. The latter is an extended version of the former.

How to get LaTeX?

Try something related to:

apt install texlive

Creating the documents

pdflatex name.tex

and then open it with a PDF viewer.

\begin and \end

Tags used to create environments.

What is an environment?
A way of formatting text in a given manner.

All documents have multiple environments.

Note: We always need the **document** environment as the first one.

Another Note: It is possible to create your own environments, although existing ones cover almost everything you can think of.

Title page

Modify the **preamble**:

```
\documentclass{article}

\title{Is \LaTeX simple?}
\date{\today}
%\date{1010-10-10}
\author{Possible CompSoc Member}

\begin{document}
    \maketitle
    \newpage

    Hello, world!
\end{document}
```

Page numbering

We can see the page number on the title page.
pagenumbering comes into handy.

```
\documentclass{article}

\title{Is \LaTeX simple?}
\date{\today}
\author{Possible CompSoc Member}
\begin{document}
    \pagenumbering{gobble}
    \maketitle

    \newpage
    \pagenumbering{arabic}
    Hello, world!
\end{document}
```

Sectioning

- For structuring the content we use:
- **section**
- **subsection**
- **paragraph**

Note: Other commands are subsubsection and subparagraph.

Table of contents

tableofcontents is the only thing we need to add!

Note: You might need to compile the document twice, because the *tableofcontents* command needs to create a new document first and then use it.

Packages

What is a package?
A way of adding more available functions.

usepackage{**Package name**}

Note: This must be place in the *preamble*.

Packages: Example

```
%...
\begin{equation}
    f(x) = x^2
\end{equation}
%...
```

You can not turn of the automatic numbering.

Packages: Example

We use a package called **amsmath**.

```
%preamble
\usepackage{amsmath}

%...
\begin{equation*}
    f(x) = x^2
\end{equation*}
%...
```

Lists: Unordered

Using the **itemize** environment:

```
\begin{itemize}
    \item CLI
    \item Vim
    \item Bash
    \item LaTeX
\end{itemize}
```

Lists: Unordered

```
\begin{itemize}
    \item[$-$] To a dash
    \item[$\ast$] To an asterisk
    \item[$.$] To a dot
    \item[$what$] To do a word
\end{itemize}
```

Note: Anything can be used here, even words.

Lists: Unordered

To change every symbol at the same time:

```
\usepackage{enumitem}

\begin{itemize}[label=$.$]
    \item Wow!
    \item This
    \item is
    \item incredible!
\end{itemize}
```

Lists: Ordered

Using the **enumerate** environment:

```
\begin{enumerate}
    \item CLI
    \item Vim
    \item LaTeX
\end{enumerate}
```

Lists: Ordered

Nested lists are easy to produce:

```
\begin{enumerate}
    \item CLI
    \begin{enumerate}
        \item cd
        \item cp
        \item mv
    \end{itemize}
    \item Vim
    \item Bash
    \item LaTeX
\end{enumerate}
```

Second Part

Mathematical equations

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```
\begin{align*}
    2 + 2 = &4
    &4 - 1 = 3
\end{align*}
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Another useful environment, offered by the **amsmath** package, is the **align** environment:

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\begin{align*}
    2 + 2 = &4
    &4 - 1 = 3
\end{align*}
```

*Note: We use the * to indicate we do not want the equations to be numbered.*

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Problem: Both equations are on the same line. We did not use \\.

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\begin{align*}
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\end{align*}
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Fractions and Integrals and Square roots

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```
\begin{align*}
    f(a, b) &= \frac{a}{b} \\
    g(a, b, x) &= \int^a_b x \\
    h(b, x) &= \sqrt[b]{x}
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    h(b, x) &= \sqrt[b]{x}
\end{align*}
```

We can also combine them:
g(a, b, \frac{x, y}) = \int^a_b \frac{x, y}

Matrices

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```
\[
\begin{matrix}
1 & 2\\
3 & 4
\end{matrix}
\]
```

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But this does not produce brackets. We could try:

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[
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\begin{matrix}
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3 & 4
\end{matrix}
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```
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1 & 2\\
3 & 4
\end{bmatrix}
\]
```

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Especially over the tables at the end.

Exercise 1

Try to replicate the document!

Pictures

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```
\begin{figure}
   \includegraphics[width=\linewidth]{images/compsoc.jpg}
   \caption{CompSoc's logo}
   \label{fig:logo}
\end{figure}
```

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Use the **figure** environment.

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   \includegraphics[width=\linewidth]{images/compsoc.jpg}
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Note: Each picture is indexed and tagged with consecutive numbers.

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Use the **figure** environment.

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\begin{figure}
   \includegraphics[width=\linewidth]{images/compsoc.jpg}
   \caption{CompSoc's logo}
   \label{fig:logo}
\end{figure}
```

Note: Each picture is indexed and tagged with consecutive numbers.
Another Note: This is the relative path. We could have used the absolute one.

Pictures: Dimensions

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linewidth modifies the width of the picture.

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[width=\linewidth,height=40in]
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We could also set the *height* to something different:

[width=\linewidth,height=40in]

If we are not sure about the dimension and want to keep the ratio, **keepaspectratio** is the option we need to add.

Pictures: Caption and Label

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caption adds a description to the image.

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label adds a hidden name to the image, for future references.

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label adds a hidden name to the image, for future references.

Example:
CompSoc's logo \ref{fig:logo} is on page \pageref{fig:logo}.

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\begin{figure}[h!]

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\begin{figure}[h!]

h = here

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\begin{figure}[h!]

h = here

t = top of the page

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\begin{figure}[h!]

h = here

t = top of the page

b = bottom of the page

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In order to crrect this, use options for the environment:

\begin{figure}[h!]

h = here

t = top of the page

b = bottom of the page

p = on an extra page

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The **figure** environment will not place the image exactly where you insert it.
LaTeX places figures **wherever it finds enough empty space**.

In order to crrect this, use options for the environment:

\begin{figure}[h!]

- h = here
- t = top of the page
- b = bottom of the page
- p = on an extra page

Using **!** forces the specified location.

Footnotes

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footnote command together with **label** **ref**

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```
\begin{document}
Course organised by CompSoc
\footnote{\label{CompSoc}Oxford University CompSoc}.\\

This society, reference \ref{CompSoc}, is great!
\end{document}
```

References: First part

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```
\documentclass{article}

\usepackage[backend=biber]{biblatex}
\addbibresource{help}

\begin{document}
This journal \cite{einstein} and this
book \cite{dirac} are nice.

\nocite{*}
\printbibliography
\end{document}
```

References: Second part

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\addbibresource{help}

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The name of the *bibliography* must be the same as the name of the .tex file.

References will not include unmentioned references. Use:

$$\backslash\textbf{nocite}\{\textbf{*}\}$$

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and also run **pdflatex -shell-escape name.tex**

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```
\usepackage[cache=false]{minted}
```

```
\begin{minted}{Python}
x = 99
if x == 99:
    #indented four spaces
    print("99 problems and writing code ain't 1.")
\end{minted}
```

Code: Notes

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```
\inputminted{python}{hello.py}
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- languages
- colouring

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There are options for almost everything:

- languages
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- new lines

Exercise 2

Try to replicate the document!

Thank you!