Computer Practicum 1

More LaTeX

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Based on LaTeX tutorial by Claudio Vellage and the Latex for Beginners workbook (University of Edinburgh).

Online LaTeX editor

https://www.overleaf.com/

Computer Practicum 1

Introduction to LaTeX

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Want bonus points? Submit your score here!

https://bit.ly/CP1Bonus22

My first LaTex file - images and positioning!

```
\documentclass{article}

\usepackage{graphicx}

\begin{document}

  \begin{figure}[h!]
    \includegraphics[width=\linewidth]{boat.jpg}
    \caption{A boat.}
    \label{fig:boat1}
  \end{figure}

  Figure \ref{fig:boat1} shows a boat.

\end{document}
```

The figure doesn't necessarily show up in the place where you put your code in the .tex file. LaTeX will put the picture on the page where it finds sufficient space.
To prevent this behavior, it's necessary to set the ***float*** value for the figure environment.

```
%...
\begin{figure}[h!]
%...
```

Setting the float by adding *[h!]* behind the figure environment
\begin tag will force the figure to be shown at the location in the document. Possible values are:

- h (here) - same location
- t (top) - top of page
- b (bottom) - bottom of page
- p (page) - on an extra page
- ! (override) - will force the specified location

My first LaTex file - tables

```
\documentclass{article}

\begin{document}

  \begin{table}[h!]
    \centering
    \caption{Caption for the table.}
    \label{tab:table1}
    \begin{tabular}{l|c||r}
      1 & 2 & 3\\
      \hline
      a & b & c\\
    \end{tabular}
  \end{table}

\end{document}
```

LaTeX offers an environment for table creation. For this purpose we use the ***table***, ***tabular*** and the ***center*** *environment*.

The ***table*** *environment* holds our other environments and allows to add a caption to our table.
The data is contained in the ***tabular*** *environment.*
Use the ***center*** *environment* to center the table on the page.

The *ampersands* & are ***column separators*** and *newline symbols* \\ are ***row separators***.
Vertical lines, passed as an argument to the tabular environment (e.g. `\begin{tabular}{l|c||r}`) and the letters tell whether we want to align the content to the **left (l)**, to the **center (c)** or to the **right (r)** for each column.

Row separators can be added with the `\hline` command.
`\caption` and `\label` commands can be used in the same way as for pictures.

..or an easier alternative

Make the table in Excel/GSheets, copy and paste in this website:

https://www.tablesgenerator.com/

My first LaTex file - table of contents

```
\documentclass{article}

\begin{document}

  \tableofcontents
  \newpage

  \section{Section}

  Dummy text

  \subsection{Subsection}

  Dummy text

\end{document}
```

Generating a ***table of contents*** can be done with a few commands. LaTeX uses the section headings to create the *table of contents.*

```
\tableofcontents
```

You can also create a ***list of figures*** and a ***list of tables***.

```
\listoffigures
\listoftables
```

Practice Task - make something fun but elegant in LaTeX

Step 1: Create a new document project in overleaf.
Step 2: The .tex file should be named something like:

<Surname_GivenName_Memes>.tex e. g. Godzilla_Gospod.tex

Step 3: Combine images, math equations and other LaTeX elements (see samples in next slides) discussed today. Add your name somewhere in the document so it is visible.

<optional>
Step 4: Submit the .tex code, other files and screenshot of the preview as a contribution to CP1Preps repository. You can do this by creating your own branch, and submitting a pull request with your updated code.

Homework

$\sum_{n=1}^{\infty} n = -\frac{1}{12}$

Advertising

Reposts

$\pi = e = 3$

"Let"

Nonsensical proofs

Very elementary math

Disrespecting other academic disciplines

High quality OC related to mathematics

$$69 = \sum_{n=1}^{9} \sum_{d|n} d$$

Theoretical computer science:

27.5 Proposition. $\vdash_{\mathbf{K}+(\mathrm{A3})} \boxdot(A \leftrightarrow B) \rightarrow \boxdot(F(A) \leftrightarrow F(B))$.

27.16 Lemma. $w \models \boxdot(p \leftrightarrow A) \rightarrow \boxdot(\Box C_i(p) \rightarrow \Box C_i(H_i))$.

Also theoretical computer science:

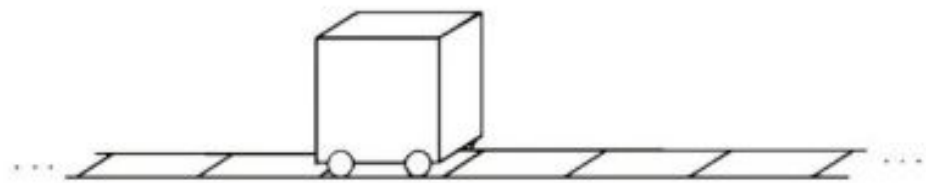
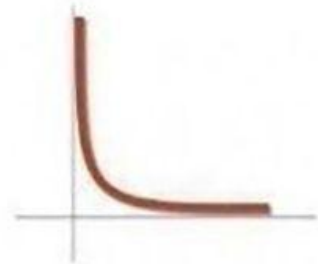


Figure 3-1. A Turing machine.

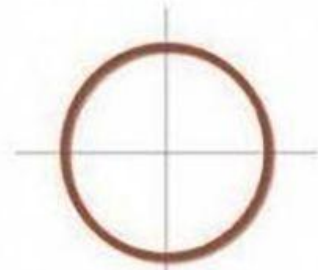
Appropriate for all ages

ALL YOU NEED IS

$$y = \frac{1}{x}$$



$$x^2 + y^2 = 9$$



$$y = |-2x|$$

$$x = -3|\sin y|$$

Learning LaTeX so your reports are more nicely typeset

Learning LaTeX because your tutor marks down Word-users

Learning LaTeX for that smug sense of elitist superiority

Learning LaTeX so you can understand memes

Fonts and effects

```
\documentclass{article}
\begin{document}
  \section{Section}
  \textbf{Hello World!}

  \subsection{Subsection}
  Structuring a document is
  \underline{easy}!
  \texttt{More text.}
  \emph{Some more text.}
  Even more text.
  \section{Another section}
\end{document}
```

There are several different LaTeX commands for a variety of
font effects.

`\textit{words in italics}`	*words in italics*
`\textsl{words slanted}`	*words slanted*
`\textsc{words in smallcaps}`	WORDS IN SMALLCAPS
`\textbf{words in bold}`	**words in bold**
`\texttt{words in teletype}`	`words in teletype`
`\textsf{sans serif words}`	sans serif words
`\textrm{roman words}`	roman words
`\underline{underlined words}`	underlined words

Coloured texts

```
\documentclass{article}
\usepackage{color}

\begin{document}

 This is some text in black.
 If I want to include some
 other colour, I can use the
 command {\color{magenta} and
 the text is going to be in
 new colour}.

 What happens if I don‘t put
 braces \color{cyan}before the
 command?

\end{document}
```

To put coloured text in a document, we have to set a *package **color*** in the preamble:

`\usepackage{color}`

The basic colour names that can be used using the ***color*** package are:

Red, green, blue, cyan, magenta, yellow and white.

To produce the coloured text, use the command:

`{\color{red}Dummy text}`

This will set the color of the text to the text in the braces.

You can also define any other color you would like to use.

For more information on how to do that, go to:

https://en.wikibooks.org/wiki/LaTeX/Colors

Font sizes

```
\documentclass{article}

\begin{document}

 This is some text in normal
 font size. I can also get
 different sizes using special
 commands like {\small for
 small words}, {\large for
 large words} and even {\huge
 for huge words}.

\end{document}
```

You can change font size using the variety of commands:

```
{\tiny tiny words}
{\scriptsize scriptsize words}
{\footnotesize footnotesize words}
{\small small words}
{\normalsize normalsize words}
{\large large words}
{\Large Large words}
{\LARGE LARGE words}
{\huge huge words}
```

tiny words
scriptsize words
footnotesize words
small words
normalsize words
large words
Large words
LARGE words
huge words

Lists

```
\documentclass{article}

\begin{document}

\begin{enumerate}
  \item First thing
  \item Second thing
  \begin{itemize}
    \item A sub-thing
    \item Another sub-thing
  \end{itemize}
  \item Third thing
\end{enumerate}

\end{document}
```

LaTeX offers two types of lists:
enumerate produces numbered lists and
itemize produces a bulleted list.
Each item in the list is defined by `\item` command.

To produce a numbered list, use:

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

For a bulleted list, use:

```
\begin{itemize}
\item Item for the first bullet
\item Item for the second bullet
\end{itemize}
```

List can be nested to produce sub-lists.

More lists

```
\documentclass{article}

\begin{document}

\begin{itemize}
  \item[-] First thing
  \item[+] Second thing
  \begin{itemize}
    \item[Fish] A sub-thing
    \item[Sea] Another
sub-thing
  \end{itemize}
  \item[Q] Third thing
\end{enumerate}

\end{document}
```

We can even change a bullet symbol with any other symbol or with even a word. To achieve that, use square brackets after the `\item` command and put whatever you want between them:

```
\begin{itemize}
\item[-] Minus instead of the bullet or
\item[bla] text instead of the bullet
\end{itemize}
```

List can be nested to produce sub-lists

Special characters

```
\documentclass{article}

\begin{document}

% enter the commands to
produce
the following text:
Item #1A\642 costs $8 & is
sold at a ~10% profit.

\end{document}
```

The following symbols are reserved characters which have a special meaning in LaTeX:

**# $ % ^ & _ { } ~ **

All of these apart from the backslash \ can be inserted as characters in your document by adding a prefix backslash:

\# \$ \% \^{} \& _ \{ \} \~{}

Note that you need to type a pair of curly brackets {} after the hat **^** and tilde **~**, otherwise these will appear as accents over the following character. For example, "`\^ e`" produces "ê".

The backslash character **** can not be entered by adding a prefix backslash, `\\`, as this is used for line breaking.
Use the `\textbackslash` command instead.

Inserting references

```
@inproceedings{
deja2016genre,
  author = Deja, Jordan Aiko and
Blanquera, Kim and Carabeo, Carlo
Eliczar and Copiaco, Jo Rupert,
  title = "Genre classification of
opm songs through the use of musical
features",
  booktitle= "Theory and Practice of
Computation: Proceedings of Workshop
on Computation: Theory and Practice
WCTP2014",
  pages = "77--88",
  year = "2016",
  issn = "0933-3657"
}
```

LaTeX includes features that allow you to easily cite references and create bibliographies in your document. We will use a separate **BibTeX file** to store the details of our references.

BibTeX has the file extension *.bib* and you should name it and kept in the same folder as your *.tex* file.
The *.bib* file is plain text - it can be edited using Notepad or your LaTeX editor (e.g. TeXMaker).

Each reference in the BibTeX file should have the format as shown on the left.

More about references

```
@article{
GROZNIK2013,
  author = "Vida Groznik and Matej Guid
    and Aleksander Sadikov and Martin
    Mo\v{z}ina and Dejan Georgiev and
    Veronika Kragelj and Samo
Ribari\v{c}
    and Zvezdan Pirto\v{s}ek and Ivan
    Bratko",
  title = "{E}licitation of
{N}eurological
    {K}nowledge with {A}rgument-based
    {M}achine {L}earning",
  journal = "{A}rtificial
{I}ntelligence
    in {M}edicine",
  volume = "57",
  number = "2",
  pages = "133 -- 144",
  year = "2013",
  issn = "0933-3657",
  doi = "https://doi.org/10.1016/j.
    artmed.2012.08.003"
}
```

Each reference starts with the **reference type**.
Reference types include:
`@article`,
`@book`,
`@incollection` for a chapter in an edited book and
`@inproceedings` for papers presented at conferences.

The reference type declaration is followed by a curly bracket, then the **citation key**. Each reference's citation key must be unique - you can use anything you want, but a system based on the first author's name and year (as in the example) is One of the easiest to keep track of.

The remaining lines contain the reference information in the Format:
`Field name = "field contents",` or like this:
`Field name = {field contents},.`

Inserting references

```
\documentclass{article}
\begin{document}
 This is some text which will be used as
 an example for the citation purpose.
 This method was introduced in our paper
 from 2013~\cite{GROZNIK2013}.
 \bibliographystyle{plain}
 \bibliography{doc1}
\end{document}
```

If you want to use your *.bib* file in the actual document to cite the reference stored in the *.bib* file, you have to use the following command at the end of the *.tex* file just before the `\end{document}`:

```
\bibliographystyle{plain}
\bibliography{Reference}
```

Where `Reference` is the name of your *.bib* file.

For citing a reference use the following command in your *.tex* file: `\cite{citationkey}`

If you don't want an in text citation, but still want the reference to appear in the bibliography, use `\nocite{citationkey}.`

To include a page number in the citation put it in square brackets before the citation key: `\cite[p. 215]{citationkey}`.

To cite multiple references include all the citation keys within the curly brackets separated by commas: `\cite{citation01,citation02,citation03}`.

Reference styles

Numerical citations

Plain The citation is a number in square brackets (e.g. [1]). The bibliography is ordered alphabetically by first author surname. All of the authors' names are written in full.

Abbrv The same as plain except the authors' first names are abbreviated to an initial.

Unsrt The same as plain except the references in the bibliography appear in the order that the citations appear in the document.

Alpha The same as plain except the citation is an alphanumeric abbreviation based on the author(s) surname(s) and year of publication, surrounded by square brackets (e.g. [Kop10]).

Author-date citations

Use the **natbib package** if you want to include author-date citations.
Natbib uses the command `\citep{...}` command for a citation in brackets (e.g. [Koppe, 29 2010]) and `\citet{...}` for a citation where only the year is in brackets (e.g. Koppe [2010]).

Natbib comes with three bibliography styles: **plainnat**, formats the bibliography in the same way as the plain style,
abbrvnat formats the bibliography in the same way as the abbrv style,
unsrtnat formats the bibliography in the same way as the unsrt style, respectively.

There are lots of other ways that you can modify citations when using the natbib package - see the package's reference sheet for full details.