Introduction to LaTeX

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About

- What is LaTeX
- How does it work
- Exercises
  - Fetch slides and work from them
  - Not everyone works with same speed/focus
  - You can skip an exercise if you know the topic

On learning

- Ask questions
  - If something does not work
  - If you do not understand something
  - If you want to know something outside the curriculum
- Also try to ask your fellow students. They might also learn something from helping you
- You are responsible for your learning

What is LaTeX

- Document preparation system
- A markup language - not WYSIWYG
  - Separates content from style
  - Independent of editor
- A front end to TeX($\tau\epsilon\chi$)
- Must be "compiled" to get a document
- The thing you should write your report in
  - Because it is better than the alternatives

Strong points of LaTeX

- Global document settings
  - Many battles have been fought with Word about this
- Great support for bibliography, references, etc.
- Creates documents that looks awesome!
  - Math looks even more awesome
- Its free, extremely stable, runs everywhere

Weak points of LaTeX

- Learning curve
  - But it is not that difficult really
  - And you are here to learn after all
- Changing layout can be a challenge
  - Figure placement can be annoying
  - The standard usually works quite well though
  - Many existing styles exists
  - The best solution is to care less about form and more about content

A simple LaTeX document

```
\documentclass{report}
\begin{document}
  some text
\end{document}
```

Slightly more advanced LaTeXdocument

```
% preamble
\documentclass[10pt,twoside,a4paper]{report}

% content
\begin{document}
\chapter{Some chapter}
\section{A section}
some textual content
\end{document}
```

Producing Output

- Compiling:`latex file.tex`
  - Will output `file.dvi`
  - Can be viewed with `xdvi`
- Postscript: `dvips file.dvi -o file.ps`
- PDF: `dvipdf file.dvi -o file.pdf`
- Alternative: `pdflatex file.tex`
  - Directly from LaTeXto PDF

Document Structure 1/2

- First a preamble
- Front page, Title page, Preface
- Table of contents (auto generated)
- Contents
- Appendix
- Bibliography (auto generated using BibTEX)

Document Structure 2/2

- Split the document into several files
  - Makes it more comprehensible
  - Also makes it easier to work in groups
- Include other files using `\input{file.tex}`
- One master file is usually the best

Preamble

- Not part of the document itself
- Typical structure:
  - Document class
  - Packages
  - Macros, environments, etc

Preamble Example

```
\documentclass[10pt,twoside,a4paper]{report}
\usepackage[english]{babel}
\usepackage{t1enc}
\usepackage{graphicx}
\usepackage{makeidx}
\usepackage{xspace}
\makeindex

\bibliographystyle{plain}

\newcommand{\word}[0]{My word\xspace}
\renewcommand{\texttt}[1]{{\tt{\small{#1}}}}
```

About the Exercises

- You can start by downloading `latex-startpackage` from `support.cs.aau.dk`
- Download the slides and follow them
  - Available on the course home page
- Some exercises start with an information slide
- You can skip an exercise if you know the topic

Exercise 1

- Create a simple document using the previous examples (or other sources)
- Compile it to a postscript or PDF file

Exercise 2

- Split the document into a master, preamble, and a content file, and recompile the document.

Parts, Chapters, and Section

- \part{}
- \chapter{}
- \section{}
- \subsection{}
- \subsubsection{}
- \paragraph{}
- Used to divide the report into logical chunks
- part and paragraph are usually not needed
- Note: These are specific to the report class

Exercise 3

- Create entries with everything from chapter to subsubsection in your document, and recompile

Italic, Bold, Teletype, and Verbatim

- Sometimes you want text in italic or something else
- `\textit{words in italic}`
- `\textbf{words in bold}`
- `\texttt{words in teletype}`
- Shorthand notation: `{\it words in italic}`
- The verbatim environment creates a teletype section in which no escaping is necessary:

```
\begin{verbatim}
\ ~{}
\end{verbatim}
```

Exercise 4

- Insert italic, bold, and teletype text into your document
- Insert a verbatim section in your document

Lists

- To create a numbered list:

```
\begin{enumerate}
  \item thing
  \item object
\end{enumerate}
```

- To create a bulleted list use `itemize`, instead of enumerate.
- Also possible to create a description lists

Exercise 5

- Create a numbered list in your document
- Create a bulleted list in your document

Labels and References

- Used for referencing within the document
- Example:

```
\section{Introduction}\label{sec:introduction}

\ref{sec:introduction}
\pageref{sec:introduction}
```

- `\ref` refers to section or figure number
- `\pageref` refers to page number
- It is custom to use `cha` prefix for chapters, `sec` for sections, and `fig` for figures.
- Note: You will often need to compile the document two (sometimes three) to get page references right.

Exercise 6

- Create a label for a section and create a reference, and a page reference.

Figures 1/3

- The graphic and graphicx packages provides a simple method for including figures:

  ```
  \includegraphics{myfigure.eps}
  ```

- Scaling:

  ```
  \includegraphics[width=6cm]{myfigure.eps}
  ```

Figures 2/3

- The figure environment enables placement, referencing, and caption text:

```
\begin{figure}[htbp]
  \centering
  \includegraphics[width=6cm]{myfigure.eps}
  \caption{Figure text.}
  \label{fig:myfigure}
\end{figure}
```

- The `htb` is placement control.
  h $\rightarrow$ here, t $\rightarrow$ top of page, b $\rightarrow$ bottom of page,
  p $\rightarrow$ special float page.

Figures 3/3

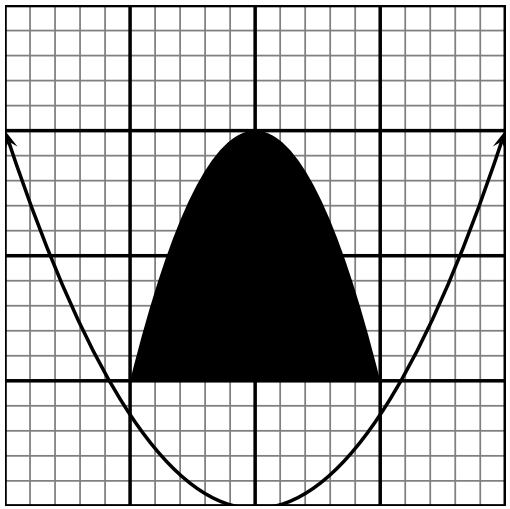
- Bitmap files (bmp, gif, jpg, png, etc.) tend to look bad when printed
- Use vector graphics when possible
  - Converting a jpg to pdf does not make it into vector graphics.
  - The figure should be created in a vector drawing program.
- For postscript files eps is preferred, for pdf, include other pdf documents.
- If you exclude the dot-suffix (e.g., .eps) in `\includegraphics`, LaTeX will look for eps for postscript, and pdf for pdf documents.

Figures 4/5

- `xfig` For making vector graphics.
- Can use latex commands and math in figure text
  - Set special flag on text field
  - Export as "Combined PS/PDF/Latex (3 parts)"

Figures 5/5 PSTricks

```
\begin{pspicture*}(0,0)(4,4)
\psgrid
\parabola*(1,1)(2,3)
\parabola{<->}(4,3)(2,0)
\end{pspicture*}
```



Exercise 7

- Insert a figure into your document.
- Scale it
- Create a label for the figure, and refer to it
- Create an eps and pdf version of the figure and make sure the document can be compiled to both postscript and pdf
- Hint: Use `epstopdf`

Table of Contents

- LaTeX can generate this automatically
- Insert the following in your master file:
  `\tableofcontents`

- Usually followed by:
  `\cleardoublepage`

- The level of section inclusion can be set. E.g.,:
  `\setcounter{tocdepth}{1}` includes parts, chapters, and sections.
- Note: As a table of contents is build using page references, LaTeX should be run several times, usually two, sometimes three.

Exercise 8

- Create a table of content for your document
- Remove subsection entries from the table of content

Build systems

- `latexmk` is a Perl script which can run LaTeXthe right amount of times to get references right.
- Usage: `latexmk file.tex` (produces dvi output)
- Or: `latexmk -pdf file.tex` for pdf output
- You can copy the script to your computer
  - Also works under Windows (you need Perl though)
- Rubber - build system that comes with Ubuntu
- Makefile - comes with latex-startpackage

Exercise 9

- Use `latexmk` to compile your document to dvi and pdf

Math Mode

- LaTeX rocks at math
- Math mode can be entered in two ways:
  - In-line: $ math mode $
  - or \(math mode \)
  - Longer:

```
\begin{equation}
math mode
\end{equation}
```

- Example: $ d^2\sqrt{2\pi} $ produces $d^2\sqrt{2\pi}$
- The LaTeX cheat sheet is handy when writing math

Exercise 10

- Create the following formulas in your document:
  $e^{i\pi} + 1 = 0$
  $d = b^2 - 4ac$, $x_1 = \frac{-b+\sqrt{d}}{2a}$
- Hint: Download the LaTeX cheat sheet (google for it)

Page Styles

- Changing the layout style in LaTeX is easy
- The page style is set like this: `\pagestyle{plain}`
- Page style can be set anywhere in the document, and will be style of the following pages, until redefined
- Build-in page styles are: `plain`, `empty`, `headings`, `myheadings`
- The package `fancyheadings` has some fancy styles, e.g., `fancy`, `fancyplain`
- `\thispagestyle` sets the style for current page only

Exercise 11

- Set your page style to `fancy`
  - Be sure to include the `fancyheadings` package
- Now set it back, because fancy looks silly

Page Numbering

- Page numbering is usually done automatically
  - But sometimes this does not fit
- Resetting the current page number to 1: `\setcounter{page}{1}`
- It is also possible to change the page number style: `\pagenumbering{roman}`.
  - `arabic` is default numbering style.

Exercise 12

- Set your page numbering to start with one in the introduction
- Use roman numerals to number the pages before the introduction

BibTeX

- The way to do citations in LaTeX
- Have one file with all books, articles, etc.
  - Can be shared across several documents
- Only includes the cited works in the report
- BibTeX automatically sorts the entries by last name
- To use BibTeX:
  `\bibliographystyle{plain}` in the preamble
  `\bibliography{bibliography}` in the master
  And have a file called `bibliography.bib` with your bibliography.
- Then use `\cite{cite_entry}` to cite.

Exercise 13

- Add a new entry to the bibliography
- Search for a bibtex entry for something project relevant using google
- Cite it in the document
- Note: It is a good idea to use $\sim$, instead of a space before `\cite`.
  - This creates a space which cannot be line breaked.

Getting Further with LaTeX

- Print out the LaTeX cheat sheet:
  - `http://www.stdout.org/~winston/latex/`
- Use google and `info latex`
- The "LaTeX Companion" is a good book
- But just use LaTeX and you will get better

LaTeX Beyond Reports

- Beamer
  - Can create very nice slides
  - `http://latex-beamer.sourceforge.net/`
  - This presentation was created with it
  - AAU theme:
    `http://www.cs.aau.dk/~ulrik/beamerthemeaau-1.0.`
- Use it for short documents
  - Will rid you of the feeling that LaTeX is complicated
  - And documents just look way better in LaTeX

Summary

- Hopefully you will know a bit more LaTeX now
- Ask questions if there is anything more you would like to know
- Anything on these slides can be found in less than five minutes using google