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Lab 13: LATEX

Comp Sci 1585
Data Structures Lab:
Tools for Computer Scientists



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How to proceed

LATEX: A Programming Language for Text

- Use commands to indicate document layout
- Not WYSIWYG: Write marked-up text into a .tex file
- \$ pdflatex converts LATEX to a .pdf file
- You can make papers and presentations with it
- It is particularly good at formatting and displaying math
- Note: links are in color today

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A simple document: simple.tex

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```
\documentclass{article}
```

```
\begin{document}
Hello there!
\end{document}
```

Basics of a **LATEX** document

2 Basics of a LATEX document



Document class

2 Basics of a LATEX document Document class

Document Classes

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- Article: For writing papers, assignments, etc.
- Report: Like article, but for things that are multiple chapters long.
- Book: For formatting actual books.
- Beamer: For making presentations like this one.

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Special Characters

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- # \$ % ^ & $_{-}$ { } ` ~ \ are reserved characters.
- You can write them using these escapes:

- % starts a comment that runs until the end of the line.
- \\ forces a line break.
- \^ and \~ by default draw above the next letter, so \~n looks like ñ.
- Opening quotes are written with ` and closing quotes with '.
- single quotes' looks like 'single quotes'
- ``double quotes'' looks like "double quotes"

Sections (like

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Sections (like this)

```
Document Structure: sections.tex
         \documentclass{article}
         \begin{document}
         \section{Introduction}
         \section{Methodology}
Sections (like
         \subsection{A Perpetual Energy Source}
         \subsection{A Radio Beacon for the Pyramids of Giza}
         \subsection{Plans for First Contact}
         \section{Results}
         \subsection{Physics Dislikes Me}
         \subsubsection{Physicists don't want the truth}
         \subsubsection{This foil is perfectly comfortable, th
         \section{Conclusion: Perhaps the real aliens are
          the friends we made along the way}
         \end{document}
```

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```
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```

Titles: title.tex

```
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How to proceed?

```
\documentclass{article}
\title{Do Lizards Run The World?}
\author{Nathan Jarus}
\date{\today}
```

\begin{document}
\maketitle

\end{document}

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- **Bold**: \textbf{your text here}
- Italic: \textit{italic text here}
- <u>Underline</u>: \underline{underlined text}
- Monospaced: \texttt{I am a robot}
- For URLs and hyperlinks, insert \usepackage{hyperref} below your document class.
- \url{http://way-cool-website.io} formats a URL nicely.
- \href{http://url.com}{displayed, underlined text} lets you put hyperlinks in your documents.
- Normally, it's better to show the person the link, rather than hide it! Use url instead of href.

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Hyperref: hyperref.tex

```
Links
```

```
\documentclass{article}
\usepackage{hyperref}
% Set link colors throughout the document
\hypersetup{colorlinks=false,
        allbordercolors={0 0 0}.
        pdfborderstyle={/S/U/W 1}
\begin{document}
\href{https://google.com}{Ask The NSA Anything!}
\url{http://www.funroll-loops.info/}
\end{document}
```

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How to

```
\begin{itemize}
```

\item Itemize makes a bulleted list.

\item Every item in the list starts with the item command.

\item You can make multiline items\\
by putting a linebreak in them.

\end{itemize}

\begin{enumerate}

\item Enumerate numbers each item.

\item Otherwise it's exactly the same as item \end{enumerate}

```
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\end{enumerate}

```
\begin{enumerate}
  \item You can also nest lists!
  \item Just start a new itemize or enumerate in a li
  \begin{enumerate}
    \item Enumerates will change numbering style.
    \item Itemizes will use a different glyph.
  \end{enumerate}
  \item Once you're done, you can keep adding new
  list items to the original list.
```

Math model

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Math model

 $X^{a}X_{a}X_{b}^{a}$

 You can write math inline by putting it between \$ signs. $f(x) = x^2$ renders as $f(x) = x^2$.

 Equations can be placed on their own in an equation environment:

$$f(x) = x^2 \tag{1}$$

$$\begin{array}{ll} \texttt{\Big(\frac{1}{3}\Big)^k} \\ \texttt{=\frac{1}{3^k}} \end{array} \qquad \qquad \left(\frac{1}{3}\right)^k = \frac{1}{3^k}$$

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

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- The figure environment is used to place images and give them captions.
- LATEX will place the figure on the page in a spot it thinks makes sense, usually at the top or the bottom.
- You must put \usepackage{graphicx} below \usepackagetage.
- The includegraphics command can then be used inside a figure to include png, jpeg, pdf, and eps files.
- The caption command sets a caption for the figure.
- \begin{figure} [H] puts the figure wherever you want, instead of letting [h] put auto-place it somewhere (see the example on the following slide); requires
 \usepackage{float} (ironically).

```
Computer Scie
```

Figure: figure.tex

```
\documentclass{article}
         \usepackage{graphicx}
         \begin{document}
         \begin{figure}[h] % Place 'here'
            \caption{4-corner simultaneous 4-day time cube}
Figures and
            \centering % Center the image
           % width=\textwidth makes the image the width of the
            \includegraphics[width=\textwidth]{timecube}
         \end{figure}
         \end{document}
```

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- As with figure, there is a table environment that lets you make tables with captions.
- Inside the table environment, you put a tabular environment that actually draws the table.
- I have never found a markup language with a decent table syntax.
- http://truben.no/table/ is a website that will generate tables for you!
- LATEX IDEs? Kile and TexMaker will do this too.
- TeX is the only one that will let you easily edit after creating it with a wizard.

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Displaying code and algorithms

- The verbatim environment shows text in a plain, monospaced font.
- If you want syntax highlighting, Pygments works well.
- The algorithm environment works like the figure environment, but for algorithms.
- There are a few algorithm typesetting packages with different appearances.

Verbatim: verbatim.tex

```
\documentclass{article}
          \begin{document}
          \begin{verbatim}
          You can write all sorts of stuff here
          \command, $$$ cash money, etc.!
Code.
algorithms,
          \end{verbatim}
          \end{document}
```

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The best way to learn LATEX

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- Is not to use it, but instead use LyX, which shows you latex source as you type.
- https://www.lyx.org
- Read the manual, and when making documents, select "View" and then "Source pane"
- I highly recommend LyX

The underlined text is clickable:

- You can include citations with Bibtex, and manage them with JabRef
- LATEX wikibook.
- CTAN has documentation on zillions of neat packages.
- MiKTeX is a Windows version of LATEX.
- Kile is my favorite editor
- TexMaker is my second favorite, but maybe is better for beginners
- TeXworks is a decent editor.
- Pandoc can convert other document formats to and from LATEX.