COMPSCL 111 / 111G

Mastering Cyberspace:
An introduction to practical computing

\LaTeX
Revision

- **LaTeX is a document preparation system**
  - Typesets documents

- **Commands**
  - Start with a backslash (\)

- **Environments**
  - \begin{name}
  - \end{name}

```latex
\documentclass[a4paper]{book}
\begin{document}
...
\end{document}
```
Text Styles

• \textbf{Argument will be bold }

• \textit{Argument will be italic }

• \textsl{Argument will be slanted }

• \textsf{Argument will be sans-serif }

• \texttt{Argument will be serif (roman) }

• \texttttt{Argument will be monospace }

• \textsc{ARGUMENT WILL BE SMALL CAPITALS}
\textit{I want to emphasize this}
Exercise

What is the output of the following LaTeX code?

\begin{verbatim}
The \textbf{quick} \textit{brown} \textsl{fox} jumps \textsf{over} the \texttt{lazy} \textsc{Dog}
\end{verbatim}

The \textbf{quick} \textit{brown} \textsl{fox} jumps \textsf{over} the \texttt{lazy} \textsc{Dog}
Font Style

• Forms
  – Declarative form (Set style from this point forward)
  – Environmental form (Create an environment that uses this style)

  – \texttt{bfseries} Bold
  – \texttt{mdseries} Normal weight (i.e. not bold)

  – \texttt{itshape} Italic
  – \texttt{slshape} Slanted
  – \texttt{upshape} Upright (opposite of slanted)
  – \texttt{scshape} Small Capitals

  – \texttt{rmfamily} Serif (roman)
  – \texttt{sffamily} Sans-serif
  – \texttt{ttfamily} Monospace (typewriter)
Example

\%Normal way to set italics
\textit{This text will be italic}

\%Environment form
\begin{itshape}
This text is also italic
\end{itshape}

\%Declarative form
\itshape
All text from this point forward will be italic
Exercise

What would the output of the following code be?

\begin{sffamily}
The quick brown fox
\end{sffamily}

jumps over \textbf{series} the lazy dog
# Font Size

<table>
<thead>
<tr>
<th>Command</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>\tiny</td>
<td>sample text</td>
</tr>
<tr>
<td>\scriptsize</td>
<td>sample text</td>
</tr>
<tr>
<td>\footnotesize</td>
<td>sample text</td>
</tr>
<tr>
<td>\small</td>
<td>sample text</td>
</tr>
<tr>
<td>\normalsize</td>
<td>sample text</td>
</tr>
<tr>
<td>\large</td>
<td>sample text</td>
</tr>
<tr>
<td>\Large</td>
<td>sample text</td>
</tr>
<tr>
<td>\LARGE</td>
<td>sample text</td>
</tr>
<tr>
<td>\huge</td>
<td>sample text</td>
</tr>
<tr>
<td>\Huge</td>
<td>sample text</td>
</tr>
</tbody>
</table>
Setting the scope of a command

• **New way to apply a command**
  – Set the scope of the command
  – Command only applies within the curly braces
  – Note: this works with the declarative forms for font style and font size

• **Format:**
  ```latex
  \{\text{command} \ldots \text{text goes here} \ldots \}
  ```
Example

{\small This text is small}

{\Large\itshape This text is large and italic}

{\tiny
\tiny\textit{This text will be tiny and italic}}

This text will be tiny, but not italic.
Aligning paragraphs

• **flushleft**
  – Environment that aligns a paragraph to the left

• **flushright**
  – Environment that aligns a paragraph to the right

• **center**
  – Environment that aligns a paragraph to the centre

\begin{center}
furuike ya\\
kawazu tobikomu\\
mizu no oto
\end{center}

\begin{center}
Three things are certain:\\
Death, taxes, and lost data.\\
Guess which has occurred!
\end{center}
Unordered Lists

- Unordered Lists
  - List that uses bullet points
  - `itemize` environment
  - `\item` used to identify each item in the list

\begin{itemize}
\item Pears
\item Apples
\item Bananas
\end{itemize}

- Pears
- Apples
- Bananas
Ordered Lists

- **Ordered Lists**
  - List that is enumerated
  - `enumerate` environment
  - `\item` used to identify each item in the list

\begin{enumerate}
\item Pears
\item Apples
\item Bananas
\end{enumerate}

1. Pears
2. Apples
3. Bananas
Description Lists

- Description Lists
  - List that is used to define terms
  - `description` environment
  - `\item[ term ]` used to identify each term in the list

\begin{description}
\item[Pears] Say something really really really long about fruit
\item[Apples] More fruit
\item[Bananas] Still more fruit
\end{description}

- Pears  Say something really really really long about fruit
- Apples  More fruit
- Bananas  Still more fruit
Quotes and Quotations

• **quote environment**
  – Used for short quotes
  – Entire environment is indented
  – The first line of a new paragraph inside *quote* is not indented.

• **quotation environment**
  – Used for longer quotes
  – Entire environment is indented
  – The first line of a new paragraph inside *quotation* is indented

This is a quote by Aristotle:
\begin{quote}
There is only one way to avoid criticism: do nothing, say nothing, and be nothing. - Aristotle
\end{quote}
### Quote versus Quotation Example

This is a quote by Aristotle:

There is only one way to avoid criticism: do nothing, say nothing, and be nothing. - Aristotle

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There is only one way to avoid criticism: do nothing, say nothing, and be nothing. - Aristotle
Verbatim

- **verbatim** environment
  - Reproduces text exactly as it appears
  - Uses a monospace font (courier)
  - Often used for computer code
  - No latex commands can be used in `verbatim`

The following commands are used in LaTeX
\begin{verbatim}
Use \ to create a line break. Use
\section{ name } to create a new section.
\end{verbatim}
Mathematics

• Three ways to enter mathematics mode

• Inline text
  – $ ... $  

• \texttt{displaymath environment}
  – Centres the maths on a line of its own

• \texttt{equation environment}
  – Centres the maths on a line of its own
  – Numbers the maths with an equation number
Examples

The equation $x = y$ is a simple equation.

The equation:
\begin{displaymath}
x = y
\end{displaymath}

is a simple equation.

The equation:
\begin{equation}
x = y
\end{equation}

is a simple equation.

The equation:
\begin{equation}
x = y
\end{equation}

(1.1)
is a simple equation.

The equation:
\begin{equation}
x = y
\end{equation}
is a simple equation.
Laying out mathematics

• Too many commands to memorise
  – Look up the commands when we need them
  – Any symbol, any structure exists somewhere
  – We will look at the most common commands
  – To apply letters to a group, we put curly braces around them

• Exponent
  – Carat (^)
  – Example: \( n^{\text{th}} \)

• Subscripts
  – Underscore (_)
  – Example: \( s_0 \)
Other common functions

- **Square roots**
  - \( \sqrt{ ... } \)
  - Example: \( \sqrt{x^2 + y^2} \) \( \sqrt{x^2 + y^2} \)

- **Fractions**
  - \( \frac{ \text{numerator} }{ \text{denominator} } \)
  - Example: \( 3\frac{ 1 }{ 2 } \) \( 3\frac{ 1 }{ 2 } \)

- **Sum**
  - \( \sum \)
  - Example: \( \sum_{k=1}^{n} k \) \( \sum_{k=1}^{n} k \)
Example

\[ \sum_{k=1}^{n} k = \frac{1}{2}n(n+1) = \frac{n(n+1)}{2} \]
If a quadratic equation is given by:
\begin{displaymath}
f(x) = ax^2 + bx + c
\end{displaymath}
Then the formula for calculating the roots of a quadratic equation is:
\begin{displaymath}
x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}
\end{displaymath}
Exercise

• Write the code that reproduces the following LaTeX:

\[ \sum_{k=0}^{n} ar^k = ar^0 + ar^1 + ar^2 + ar^3 + \ldots + ar^n \]

The sum of a geometric series is:

We can rearrange the equation to produce the simple formula:

\[ \sum_{k=0}^{n} ar^k = \frac{a(1 - r^{n+1})}{1 - r} \]
Exercise

The sum of a geometric series is:
\begin{displaymath}
\sum_{k=0}^{n}ar^{k} = a^0 + a^1 + a^2 + a^3 + \ldots + a^n
\end{displaymath}

We can rearrange the equation to produce the simple formula:
\begin{displaymath}
\sum_{k=0}^{n}ar^{k} = \frac{a(1-r^{n+1})}{1-r}
\end{displaymath}
Adding functionality

• `\usepackage{ packagename }`
  – A library that adds or modifies the commands available
  – Thousands of packages available
  – Some are very useful

• Add the `\usepackage` command to the preamble

```latex
\documentclass[a4paper]{article}
\usepackage{graphicx}
\begin{document}
...\end{document}
```
graphicx

- Package that allows you to import graphics
  - Graphics must be in .eps format (latex compiler) or .jpg/.png (pdflatex compiler)
  - Can set width and height
  - Other options are also available

- `\includegraphics[options]{Example.png}

```latex
\documentclass[a4paper]{article}
\usepackage{graphicx}
\begin{document}
This is a simple picture
\begin{center}
\includegraphics[width=10cm]{Example.png}
\end{center}
\end{document}
```
Summary

• **LaTeX is a very good typesetting package**
  – Excellent for mathematics
  – Excellent for long documents
  – Excellent for people who really care about presentation
  – Very configurable
  – Steep learning curve (but worth it for those that bother)

• **Recommended software for use on Windows**
  – MikTeX (LaTeX distribution)
  – TeXWorks (text editor with built in LaTeX compiler)