COMPSICI 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}

\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 monospace}
- \textsc{ARGUMENT WILL BE SMALL CAPITALS}
\emph{I want to \emph{emphasize this}}

I want to emphasize this

\textit{I want to \textit{emphasize this}}

I want to emphasize this
Exercise

What is the output of the following LaTeX code?

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

The quick brown fox jumps over the lazy Dog
Font Style

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

  – \textbf{Bold}
  – \textit{Italic}
  – \textsl{Slanted}
  – \textup{Upright (opposite of slanted)}
  – \textsc{Small Capitals}
  – \textsf{Serif (roman)}
  – \texttt{Sans-serif}
  – \ttfamily{Monospace (typewriter)}
Example

\textit{This text will be italic}

\begin{itshape}
This text is also italic
\end{itshape}

\itshape
All text from this point forward will be italic

This text will be italic

This text is also italic

All text from this point forward will be italic
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:**
  \{\texttt{\textbackslash command} ... text goes here ... \}
Example

\{\tiny This text will be tiny and italic\}
\{\Large\textit{This text will be tiny and italic}\}
This text will be tiny, but not italic.

This text is small

This text is large and italic

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
  - \texttt{\textbackslash 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 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

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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}

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Use `\` to create a line break. Use `\section{ name }` to create a new section.
Mathematics

• Three ways to enter mathematics mode

• Inline text
  – $ \ldots \ $

• `\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 $x = y$ is a simple equation.

The equation:
\begin{displaymath}
(1.1)\quad x = y
\end{displaymath}
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: \( n^{th} \)

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

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

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

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

\[ \sum_{k=1}^{n} k = \frac{1}{2}n(n+1) = \frac{n(n+1)}{2} \]

\[ \sum_{k=1}^{n} k = \frac{1}{2}n(n+1) = \frac{n(n+1)}{2} \]
Exercise

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:

The sum of a geometric series is:

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

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 = ar^0 + ar^1 + ar^2 + ar^3 + \ldots + ar^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

\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}}`
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)