



COMPSCI 111 / 111G

*Mastering Cyberspace:
An introduction to practical computing*

L^AT_EX

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 }
 - `\textrm{` Argument will be serif (roman) }
 - `\texttt{` Argument will be monospace }
 - `\textsc{` ARGUMENT WILL BE SMALL CAPITALS }
-

Exercise

Using the normal forms for setting font styles, what commands would you use to make the text "Hello" appear sans-serif, bold and italic?

Font Style

- **Forms**

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

 - `\bfseries` Bold
 - `\mdseries` Normal weight (i.e. not bold)

 - `\itshape` Italic
 - `\slshape` Slanted
 - `\upshape` Upright (opposite of slanted)
 - `\scshape` Small Capitals

 - `\rmfamily` Serif (roman)
 - `\sffamily` Sans-serif
 - `\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

Exercises

Using the declarative forms for setting font styles, what commands would you use to make the text "Hello" appear sans-serif, bold and italic.

Using the environment forms for setting font styles, what commands would you use to make the text "Hello" appear sans-serif, bold and italic.

Font Size

Command	Output
<code>\tiny</code>	sample text
<code>\scriptsize</code>	sample text
<code>\footnotesize</code>	sample text
<code>\small</code>	sample text
<code>\normalsize</code>	sample text
<code>\large</code>	sample text
<code>\Large</code>	sample text
<code>\LARGE</code>	sample text
<code>\huge</code>	sample text
<code>\Huge</code>	sample text

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:**
{\command ... text goes here ... }

Example

```
{\small This text is small}
```

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

```
{  
\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}
```

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}
```

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] Fruit  
\item[Apples] More fruit  
\item[Bananas] Still more fruit  
\end{description}
```

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

```
\begin{quote}
```

```
They underestimated me.
```

```
Our nation must come together to unite
```

```
After all, Europe is America's closest ally
```

```
\end{quote}
```

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**
 - `$ ... $`
 - **`displaymath` environment**
 - Centres the maths on a line of its own
 - **`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 $x = y$ is a
simple equation.

The equation:
`\begin{displaymath}`
 $x = y$
`\end{displaymath}`
is a simple equation.



The equation:
$$x = y$$

is a simple equation.

The equation:
`\begin{equation}`
 $x = y$
`\end{equation}`
is a simple equation.



The equation:
$$x = y \tag{1.1}$$

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: $n^{\{th\}}$  n^{th}

- **Subscripts**

- Underscore (_)
- Example: s_{0}  s_0

Other common functions

- **Square roots**

- `\sqrt{ ... }`

- Example: `\sqrt{ x^2 + y^2 }`

$$\sqrt{x^2 + y^2}$$

- **Fractions**

- `\frac{ numerator }{ denominator }`

- Example: `3\frac{ 1 }{ 2 }`

$$3\frac{1}{2}$$

- **Sum**

- `\sum`

- Example: `\sum_{k=1}^n k`

$$\sum_{k=1}^n k$$

Example

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

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

Example

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}
```

If a quadratic equation is given by:

$$f(x) = ax^2 + bx + c$$

Then the formula for calculating the roots of a quadratic equation is:

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Exercise

- Write the code that reproduces the following LaTeX:

The sum of a geometric series is:

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

We can rearrange the equation to produce the simple formula:

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

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}`**

```
\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)
 - TeXnicCenter (An IDE for using LaTeX easily)