



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

What is the output of the following LaTeX code?

```
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)

- `\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
```

Exercise

What would the output of the following code be?

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

jumps over \bfseries the lazy dog
```

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}
```



The following commands are used in LaTeX

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:
$$x = y \quad (1.1)$$

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:

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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:

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

Exercise

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)
 - TeXWorks (text editor with built in LaTeX compiler)
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