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 monospace}
- \textsc{ARGUMENT WILL BE SMALL CAPITALS}

\textbf{\texttt{\textit{\textsc{\textbf{I want to \texttt{\textit{\textsc{emphasize this}}}}}}}}

\textit{I want to emphasize this}

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\textit{I want to emphasize this}
Exercise

What is the output of the following LaTeX code?

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

The quick brown fox jumps over the lazy dog

Example

\begin{sffamily}
This text will be italic
\end{sffamily}

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

\begin{bfseries}
All text from this point forward will be italic
\end{bfseries}

Exercise

What would the output of the following code be?

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

jumps over \bfseries the lazy dog

The quick brown fox jumps over 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>\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:

\{
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.

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

- \texttt{flushleft}
  - Environment that aligns a paragraph to the left

- \texttt{flushright}
  - Environment that aligns a paragraph to the right

- \texttt{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

#### LaTeX Code
```
\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

#### LaTeX Code
```
\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

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

- Pears: Say something 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

#### LaTeX Code
```
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:
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This is a quote by Aristotle:
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 \ for a line break. Use \section{ name } to create a new section.
\end{verbatim}

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Use \ for 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: \begin{equation}
x = y
\end{equation} is a simple equation.

The equation: \begin{equation}
x = y \quad (1.1)
\end{equation} is a simple equation.

The equation $x = y$ 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
  - Example: \( \sqrt{x^2 + y^2} \)

- Fractions
  - Example: \( \frac{1}{2} \)

- 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:
\[
f(x) = ax^2 + bx + c
\]
Then the formula for calculating the roots of a quadratic equation is:
\[
x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}
\]

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x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}
\]
**Exercise**

- Write the code that reproduces the following LaTeX:

The sum of a geometric series is:

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

We can rearrange the equation to produce the simple formula:

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

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**Adding functionality**

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

- Add the \texttt{\usepackage} command to the preamble

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

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**graphix**

- 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

- \texttt{\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)