

A guide to writing documents in L^AT_EX

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1 Lists

A common thing to wish for is a set of bullet points. This is easy using the `itemize` environment.

- This is a bullet point.
- And so is this.

is generated by:

```
\begin{itemize}

  \item This is a bullet point.

  \item And so is this.

\end{itemize}
```

1.1 Enumerate

Sometimes, however, you may wish to number your points. This is a perfect use for the `enumerate` environment. The syntax is very similar:

```
\begin{enumerate}

  \item This should be automatically numbered one.

  \item and two
```

```
% \ldots produces ellipses '...'
\item \ldots three, hopefully.

\end{enumerate}
```

1. This should be automatically numbered one.
2. and two
3. ...three, hopefully.

1.2 The description environment

Sometimes, however, you wish to create your own labels for a list and have them bolded. This is a case for the `description` environment. Labels are inserted after `\item` in square brackets: [].

An example:

A custom label and the rest of the entry.

comes from

```
\begin{description}

  \item[A custom label] and the rest of the entry.

\end{description}
```

2 The Math environment

The `Math`¹ environment is used to neatly type-set equations and other text requiring geometrical manipulation.

The `$` (dollar) symbol is a short-cut to start and end the `Math` environment. You can still use `\begin{math}` and `\end{math}` if you prefer, but the `$` is a lot quicker!

A single `$` sets the math inline, and a double (`$$`) sets it on its own line.

A quick example serves well:

¹Yes, it really is using the American spelling. As is the case with most software, US spellings are adopted for uniformity. More importantly, Donald Knuth, the inventor of `TEX` was American.

$1 + 1 = 2$, but in Binary
(where the digit at location n is worth 2^n),
 $1 + 1 = 10$.

$1 + 1 = 2$, but in Binary (where the digit at location n is worth 2^n), $1 + 1 = 10$.
More complicated examples look better set on their own line:

$\mathrm{e}^{\pi i} - 1 = 0$

$$e^{\pi i} - 1 = 0$$

A more complicated example, using the `equation` environment.

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \tag{1}$$

3 Tables

Tables are both easy and tricky in \LaTeX . Their general form is simple, but inputting them is fairly verbose. Let's show an example.

To generate a table of powers of two:

$$\begin{array}{l|l} 2^0 & 1 \\ 2^1 & 2 \\ 2^2 & 4 \end{array}$$

```
% centre the table on the page horizontally
\begin{center}
  % the l | c defines two columns:
  % left-aligned and centre-aligned
  % the '|' tells TeX to print a vertical line between
  % the two columns
  \begin{tabular}{l | c}
    % Rows are written on lines separated by '\\
    % Columns are separated on those lines by '&'
    % Other commands/environments such as math
    % can be embedded in the entries
    $2^0$ & 1 \\
    $2^1$ & 2 \\
    $2^2$ & 4 \\
    %
  \end{tabular}
\end{center}
```

The first table is OK, but there are many circumstances when you would prefer the table to 'float' to the top of the page. To do this, we need to encapsulate the tabular in a table environment.

```
% the 'table' environment allows the tabular to 'float'.
% It also gives it a caption and a table number that
% can be used to reference it with the \ref{} command later.
\begin{table}
  % centre the table on the page horizontally
  \centering
  % the l | c defines two columns:
  % left-aligned and centre-aligned
  % the '|' tells TeX to print a vertical line
  % between the two columns
```

2^0	1
2^1	2
2^2	4

Table 1: Powers of two

```

\begin{tabular}{l | c}
% Rows are written on lines separated by '\\
% Columns are separated on those lines by '&'
% Other commands/environments such as math
% can be embedded in the entries
$2^0$ & 1 \\
$2^1$ & 2 \\
$2^2$ & 4 \\
%
\end{tabular}
%
% Give the table a caption
\caption{Powers of two}
%
% \label MUST come AFTER \caption and the table itself, or
% you run the risk of the numbering being incorrect
% when used later.
\label{table:powers_of_two}
\end{table}

```

Once you have defined a `label`, you can use it with the `\ref{}` command. So, to refer to the table above at Table 1, you simply write `Table~\ref{table:powers_of_two}`.

Note the ‘~’, which tells \TeX not to separate the word ‘Table’ and the reference number over a line boundary (for the geeks, this is called a ‘non-breaking space’).

4 Graphics and figures

There is one thing I also want to include in this example, and that is how to include graphics/figures/diagrams.

This is a common problem, and thankfully is simple in \LaTeX provided:

- a) Your figure is in `.pdf` format;
- b) You don't mind where it is placed on the page;
- c) It scales sensibly (i.e., is preferably in a *vector* format).

If all these are true, then using the `\includegraphics` command in the `figure` environment should do the trick, like so:

```
% Start the figure environment with a preference for
% placing at the top (t) of the page
\begin{figure}[t]
  \centering
  \includegraphics[width=\textwidth]{Bristol_logo.pdf}
  \caption{Here is a pretty figure}
  \label{figure:my_first_figure}
\end{figure}
```



Figure 1: Here is a pretty figure

5 Citations and bibliography

Citing is easy once you have a `.bib` file. This is the first thing that must be produced (see other documentation on this)

Once you have a `.bib` file, you can simply cite a reference [1] by its key. To include the list of references you need to invoke the following commands where you want it inserted (typically at the end of the document).

```
\bibliographystyle{abbrv}  
\bibliography{myreferences}
```

creates:

References

- [1] S. J. Hollis. A guide to writing documents in LaTeX. *COMS12303 — Origins of Computer Science* <https://www.cs.bris.ac.uk/Teaching/Resources/COMS12303/LaTeX.html>, 2008.