LaTeX reference

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https://www.sharelatex.com/learn/Main_Page

1 Structure/Appearance

1.1 Types of documents

1.1.1 Article

```
\documentclass[12pt]{article}
\documentclass[11pt]{article}
\documentclass[10pt]{article}
```

(10pt is the default font size)

1.1.2 Report

1.2 Margins

1.2.1 Entire document

1. Sides (odd- and even-numbered pages):

   ```
   \addtolength{\oddsidemargin}{-0.875in}
   \addtolength{\evensidemargin}{-0.875in}
   \addtolength{\textwidth}{1.75in}
   ```

2. Top/bottom:

   ```
   \addtolength{\topmargin}{-0.875in}
   \addtolength{\textheight}{1.75in}
   ```

A better way (both do the same thing; can customize the second a little more):

- `\usepackage{fullpage}`
- `\usepackage[margin=1in]{geometry}`

1.2.2 Blocks of text

1.3   Line spacing and indentation

\setlength{\parindent}{0m} Set indent for new paragraphs

\setlength{\parskip}{0.5em} Set spacing between paragraphs

1.4   Headers and footers

In preamble:

```
\usepackage{fancyhdr}
\pagestyle{fancy}
\setlength{\headheight}{15pt}
\lhead{text} % Top left
\rhead{text} % Top right
\chead{text} % Top center
\lfoot{text} % Bottom left
\rfoot{text} % Bottom right
\cfoot{text} % Bottom center
```

The `\headheight` option sets the amount of space between the header and the top edge of the paper. Value has to be greater than some amount, otherwise will get an error message. Document still compiles, but better safe than sorry.

1.5   Text alignment

1.5.1   Horizontal alignment

\usepackage{ragged2e}

- \begin{flushright}...\end{flushright}
- \begin{center} ... \end{center}
- \begin{justify} ... \end{justify}

```
\begin{center}
    ...
\end{center}
```

vs.

```
\centering
```

Using `begin/end` will pad above and below with white space (like bulleted lists). Don't use it inside the figure environment. `centering` will not pad with white space. Use braces: `{\centering text I want centered.}` `\center` is not a thing.

`\hfill` will essentially push the text in front of it to the right edge of the document.

```
This text is on the left.\hfill This text is on the right.
```

This text is on the left.   This text is on the right.

1.5.2 Vertical alignment

[ct] Options like this will center at top, center, etc.

1.6 Spacing

This website is glorious:
http://www.terminally-incoherent.com/blog/2007/09/19/latex-squeezing-the-vertical-white-space/

- \newpage Jump to a new page after previous section
- \\ new line
- \hspace horizontal space
- \hspace{20 mm} horizontal blank space equal to 20 mm
- \vspace vertical space
- \noindent self-explanatory

1.7 Font

1.7.1 Font style

\textbf{This text is bold}
\textit{This text is in italics}
\emph{This text is also in italics}
\underline{This text is underlined}
\texttt{This text is computer style}
\textsf{sans serif}
\textsl{slanted (slightly different from italics}
\textsc{Small caps}

1.7.2 Font size inside text

{\Large I want this text to be big.}

I want this text to be big.

(enclosing entire thing in {}s keeps from having to use \normalsize at the end).

\Huge
\huge
\Large
\large
\normalsize
\small
\footnotesize
\scriptsize
\tiny

2 Sections

2.1 Nested section options

\section{My First Section}

```
\subsection{My Subsection}
\subsubsection{A subsubsection}
\paragraph{text}
\subparagraph{text}
```

Paragraphs are not numbered or followed by a line break. There appears to be no difference between `\paragraph{}` and `\textbf{}` except for some extra space after the paragraph. Note that `\paragraph{}` and `\par` are not the same thing. `\par` does the same thing as a blank line; useful if you don't want unnecessary blank space.

2.2   Referring to sections in text using section labels

```
See section $\S$\ref{data} for the data description.
...
\subsection{The Data}\label{data}
...
```

2.3   Customize sectioning in the preamble

(See § 8 for adding color to section names).

Change font size, make font bold, etc.

```
\usepackage{titlesec}
\titleformat*{\section}{\LARGE\bfseries}
\titleformat*{\subsection}{\Large\bfseries}
\titleformat*{\subsubsection}{\large\bfseries}
\titleformat*{\paragraph}{\large\bfseries}
\titleformat*{\subparagraph}{\large\bfseries}
```

(not sure what the subparagraph is.)

Use roman numerals instead of regular numbers

```
\renewcommand{\thesection}{\Roman{section}}
```

3   Figures

```
\usepackage{graphicx}
...
\begin{figure}[h]
\centering
\includegraphics[width=5.0in]{GreekSymbols.jpg}
\caption{How to insert greek symbols in LaTeX}
\label{greek}
\end{figure}
```

placement specifiers: `[htbp!]` 'here', 'top', 'bottom',...

4   Tables

```
\begin{table}[h]
\caption{Values for polytropic index $n$ = 4.5}
\centering
\begin{tabular}{ c c c c c c c c c  }
 \hline\hline
$n$ & $\xi_1$ & $\rho_c/\rho$ & $N_{n}$ & $W_n$ & $\Theta_n$
& $\rho_c[g\,cm^{-3}]$ & $P_c[dyne\,cm^{-2}]$ & $T_c[K]$ \\
\hline
4.5 & 31.841 & 6187.500 & 0.658 & 4917.415 & 3.329 & 8718.704 &
5.535e19 & 4.742e7 \\
\hline
\end{tabular}\\
\label{table:nonlin}
\end{table}
```

For the `tabular` line, `c` stands for center-justified; use `l` and `r` for left and right justified.

5   Maths!

5.1   Inside text

Examples

- `$\frac{1}{4}$` $\to \frac{1}{4}$
- `$G=6.67\times10^{-8}$` $\to G = 6.67 \times 10^{-8}$

If text is bold, make math symbols bold as well:

`\textbf{This article discusses the \boldmath$\beta$ parameter}`

This article discusses the $\boldsymbol{\beta}$ parameter

5.2   Equations

5.2.1   Numbered equations

```
\begin{equation}
    P_{\textrm{mag}} = \frac{B^2}{\sqrt{4\pi\rho_o}}
\end{equation}
```

$$\boxed{P_{\text{mag}} = \frac{B^2}{\sqrt{4\pi\rho_o}}} \tag{1}$$

INCLUDE LABELING AND REFERENCING HERE!

5.2.2 Equations without numbering

Note that the `\boxed{...}` commands are putting the examples in boxes, but are not necessary for writing equations.

```
\begin{equation*}
    \boxed{%
    P_{\textrm{mag}} = \frac{B^2}{\sqrt{4\pi\rho_o}}
    }
\end{equation*}
```

$$\boxed{P_{\text{mag}} = \frac{B^2}{\sqrt{4\pi\rho_o}}}$$

Or simply put double \$s on each side of equation:

```
$$  P_{\textrm{mag}} = \frac{B^2}{\sqrt{4\pi\rho_o}} $$
```

$$P_{\text{mag}} = \frac{B^2}{\sqrt{4\pi\rho_o}}$$

This may not work for more complicated math, such as matrices.

5.2.3 Aligning equations

```
\usepackage{amsmath}
...
\begin{align}
k_1 &= hf(x_n,y_n)\\
k_2 &= hf(x_n+\frac{1}{2}h,y_n+\frac{1}{2}k_1)\\
k_3 &= hf(x_n+\frac{1}{2}h,y_n+\frac{1}{2}k_2)\\
k_4 &= hf(x_n+h,y_n+k_3)\\
y_{n+1} &=
y_n+\frac{1}{6}k_1+\frac{1}{3}k_2+\frac{1}{3}k_3+\frac{1}{6}k_4+O(h^5)\\
\end{align}
```

$$k_1 = hf(x_n, y_n) \tag{2}$$

$$k_2 = hf(x_n + \frac{1}{2}h, y_n + \frac{1}{2}k_1) \tag{3}$$

$$k_3 = hf(x_n + \frac{1}{2}h, y_n + \frac{1}{2}k_2) \tag{4}$$

$$k_4 = hf(x_n + h, y_n + k_3) \tag{5}$$

$$y_{n+1} = y_n + \frac{1}{6}k_1 + \frac{1}{3}k_2 + \frac{1}{3}k_3 + \frac{1}{6}k_4 + O(h^5) \tag{6}$$

$$\tag{7}$$

Can also remove numbering from aligned equations:

```
\begin{align*}
    ...
\end{align*}
```

5.3 Size of brackets, parentheses, etc.

In order of increasing size:

```
\big( ... \big)
\Big( ... \Big)
\bigg( ... \bigg)
\Bigg( ... \Bigg)
```

BETTER:

```
\left( ... \right)
```

to scale size of brackets to what is inside them!

Increase size of fraction inside text:

```
\cfrac{1}{2}
```

There are $\frac{1}{2}$ as many as there were.

There are $\cfrac{1}{2}$ as many as there were.

5.4 Operations

5.4.1 Integrals

```
$\int$ % indefinite integral
$\int_{x1}^{x2}$ % definite integral, between x1 and x2
```

5.4.2 Square root

```
$\sqrt{2\ln(2)}$
```

5.4.3 Summation (and the multiplication version)

```
$$\sum_{n=1}^{\infty} 2^{-n} = 1$$
```

$$\sum_{n=1}^{\infty} 2^{-n} = 1$$

```
$$ P(D|M) \propto \prod^{N-1}_{i=0}\left\{\exp
    \left[-\frac{1}{2}\left[\frac{y_i-y(x_i|a_j)}
{\sigma}\right]^2\right]\Delta y \right\} $$
```

$$P(D|M) \propto \prod_{i=0}^{N-1}\left\{\exp\left[-\frac{1}{2}\left[\frac{y_i - y(x_i|a_j)}{\sigma}\right]^2\right]\Delta y\right\}$$

6   Symbols

```
\AA{}    % Angstrom (does not go in between $s)
\infty   % infinity
\sim     % '~'
\approx  % 'double ~'
\propto  % proportionality symbol (like alpha)
\equiv   % like '=', but with three lines.
\& \%    % include these symbols in document
         % (also precede a space with '\' when in math mode).
\pm      % plus or minus (\mp for minus or plus)
```

some text

7   Itemized Lists

7.0.1   Adjust spacing between items

In preamble:

```
\usepackage{enumitem}
\setlist[1]{itemsep=-2pt}
```

Within text: no space between items, no space between text and list. (Can also add this to \setlist in preamble to apply globally).

```
\begin{itemize}[noitemsep,topsep=0pt]
```

No space between items:

```
\usepackage{mdwlist}
...
\begin{itemize*}
    \item ...
\end{itemize*}
```

7.0.2   Numbering

1.1, 1.2 $\rightarrow$ 1.2.1,1.2.2, etc

```
\usepackage{enumitem}
...
\begin{enumerate}[label*=\arabic*.] % ???
\begin{enumerate}[I] % roman numerals
\begin{enumerate}[I.] % roman numberals followed by a period
\begin{enumerate}[(a)] % you get the idea...
```

To go from section numbering 0.0.1 to just 1, put this in the preamble (copied from internet, but not actually sure how this works).

```
\usepackage{titlesec}
```

```
\titleformat{\section}%
  [hang]% <shape>
  {\normalfont\bfseries\Large}% <format>
  {}% <label>
  {0pt}% <sep>
  {}% <before code>
  \renewcommand{\thesection}{}% Remove section references...
  \renewcommand{\thesubsection}{\arabic{subsection}}%...from subsections
  \renewcommand{\thesubsubsection}{\arabic{subsubsection}}%...from subsections
\begin{document}
...
```

8   Color

`\usepackage{color}` is required for pre-defined colors (white, black, red, green, blue, cyan, magenta, yellow)

`\usepackage{xcolors}` is needed to define new colors (see SS **??**).

8.1   Color section names

In Preamble:

```
\usepackage{sectsty}
\sectionfont{\color{blue}}
\subsectionfont{\color{blue}}
\subsubsectionfont{\color{blue}}
```

8.2   Color background

```
\usepackage{xcolor}
\pagecolor{yellow!30}
```

8.3   Color text

```
\usepackage{color}
...
\textcolor{red}{I want the text in the brackets to be red.}
```

8.4   Define your own colors!

http://latexcolor.com

```
\usepackage[usenames, dvipsnames]{color}
 \definecolor{mypink1}{rgb}{0.858, 0.188, 0.478}
 \definecolor{mypink2}{RGB}{219, 48, 122}
 \definecolor{mypink3}{cmyk}{0, 0.7808, 0.4429, 0.1412}
 \definecolor{mygray}{gray}{0.6}
\textcolor{mygray}{text I want to be gray}.
```

9 Hyperlinks

Insert hyperlink:

```
\url{http://google.com}
\href{http://google.com}{link text}
\href{http://google.com}{\textcolor{blue}{link text}}
```

For more information, visit this link.

10 Putting text in a box

```
\usepackage{xcolor}
\usepackage{lipsum}
\begin{document}
\lipsum[1]
\medskip
\noindent\fcolorbox{red}{yellow}{%
   \minipage[t]{\dimexpr0.48\linewidth-2\fboxsep-2\fboxrule\relax}
      \lipsum[2]
   \endminipage}\hfill
   \fcolorbox{red}{yellow}{%
   \minipage[t]{\dimexpr0.48\linewidth-2\fboxsep-2\fboxrule\relax}
      \lipsum[3]
   \endminipage}
\medskip
\lipsum[4]
```

Notes: You can adjust the thickness of border and padding of \fcolorbox{<border-color>}{<background-color>}{<contents>}
by setting \fboxrule=<value><unit> and \fboxsep=<value><unit>, respectively. Put the setting before invoking
\fcolorbox{<border-color>}{<background-color>}{<contents>}. For example: \fboxrule=1pt and \fboxsep=5pt.
Use t, c, b options to align the base line of the most top row, the center row and the most bottom row with the
surrounding baseline.

11 Bibliographies

```
\bibliographystyle{plain}
\begin{document}
... \cite{id} ...
\bibliography{reffile}
\end{document}
```

11.1 Creating and using a makefile

```
cl> vi reffile.bib
  @ARTICLE{label_name,
    title={},
    journal={},
    ...
  }
cl> vi makefile
```

```
 my_paper: paper.tex
    pdflatex paper
    bibtex paper
    pdflatex paper
    pdflatex paper
cl> make my_paper
```

12   Columns

```
\begin{minipage}[t]{0.2\textwidth}
    stuff
\end{minipage}
\begin{minipage}[t]{0.8\textwidth}
    longer stuff
\end{minipage}
```

13   Misc

13.1   Tips

To squelch that stupid warning about "possible unwanted white space", add a `%` sign after the opening bracket:

```
{%
    blah blah blah
}
```

13.2   Create your own command!

```
\newcommand{\bla}{blah blah blah}
```

13.3   Verbatim

`verb` is used "in line", while `verbatim` makes a display. E.g.

```
\begin{verbatim}
cl> git status
cl> git add -A
cl> git commit -m "commit message"
end{verbatim}
```

(``endverbatim'' is also preceded with a backslash, but there were difficulties in printing it out in this document).

```
cl> git status
cl> git add -A
cl> git commit -m "commit message"
```

Or do:

```
Define a document class like this: \verb|\documentclass{article}|
```

Define a document class like this: `\documentclass{article}`