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

1.1.3 Beamer

This one may or may not have its own how-to document.

1.2 Margins

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}`

1.3 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}
\lhead{text} % Top left
\rhead{text} % Top right
\chead{text} % Top center
\lfoot{text} % Bottom left
\rfoot{text} % Bottom right
\cfoot{text} % Bottom center
```

1.5 Text alignment

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

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

vs.

```
\centering
```

Both are *horizontal* alignments. 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.

1.6 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
```

1.7 Font style

```
\textbf{This text is bold}
\textit{This text is in italics}
\emph{This text is also in italics.. what's the difference??}
\underline{This text is underlined}
```

1.8 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

1.8.1 Center justify text

```
\begin{centering}
    Here is some text to go in the middle of my page, e.g. a title
\end{centering}
```

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 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!

http://www.math.harvard.edu/texman/node17.html

5.1 Inside text

Examples

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

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

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

This article discusses the β parameter

5.2 Equations

5.2.1 Numbered equations

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

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

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*}
```

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

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

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

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

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!

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

7.0.4 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*}
```

7.0.5 Numbering

1.1, 1.2 → 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}`