LaTeX reference

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July 6, 2017

- https://www.sharelatex.com/learn/Main_Page
- http://texdoc.net/texmf-dist/doc/latex/lshort-english/lshort.pdf
- http://texdoc.net/texmf-dist/doc/latex/titlesec/titlesec.pdf

Contents

Check `filename.log` for version of packages used. May need to add `\listfiles` in the preamble first.

1. unsorted

Counters:

```
\newcounter{paranum}
\refstepcounter{paranum}\theparanum
 % Before adding the 'refstepcounter{paranum} part, the counter started at 0
 %  and didn't increment. Adding it started at 1, and did increment.

\the<counter>  % In general...

\setcounter{tocdepth}{4} % Levels to show in table of contents
\setcounter{secnumdepth}{4} % Levels of sections to show numbers (4 --> paragraphs are numbered)
```

`\include` and `\input`...something to do with using several different files for one big document.

```
    \usepackage{amsmath, amsfonts}
    $ a\:\text{and}\:b_\in_\mathbb{N}$
```

$$a \text{ and } b_{\in_{\mathbb{N}}}$$

2. Background

```
\usepackage[<options>]{background}
 % or
\usepackage{background}
\backgroundsetup{<options>}  % Can be used in body of document

% Options:
pages=all|some
opacity=n  % 0 <= n <= 1
color=
contents=

\BgThispage
\NoBgThispage
```

3. Drawing grids and diagrams

```
\usepackage[<options>]{tikz}
...
\begin{document}

% Dimensions to use for entire pic [cm... where tikzpicture options define the units...?]
\def\w{18}
\def\h{18}

\begin{tikzpicture}[x=1cm, y=1cm, semitransparent] % x,y units for grid coordinates below
    \draw[step=1mm, line width=0.1mm, black!30!white] (0,0) grid (\w, \h);
    % step - width of each box
    % line width - thickness of lines
    % (0,0) - relative to... ?

    \node[draw] at (0,0) {text}  % align = left|right, text width=
```

4. Types of documents

```
\documentclass[<options>]{article}
options:
    12pt      % 12pt font (default is 11pt)
    twoside   % two-sided document (affects page-numbers)
```

5. Units

px pixels, depends on browser, use for electronic media
pt points, use in print media
em Horizontal size, 1em is equal to the font size of the text.
ex Vertical size, 1ex is equal to the height of the letter 'x' in the relevant font (usually).

6. Layout

https://tex.stackexchange.com/questions/42371/margins-and-text-position

6.1 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}
```

```
\usepackage{fullpage}
```

Best: use the `geometry` package:

```
\usepackage[margin=1in]{geometry}
\usepackage[left=1in,right=1in,top=1in,bottom=1in]{geometry}
\usepackage[textwidth=6.0in]{geometry}
\usepackage[hmargin=1cm,vmargin=1cm]{geometry}

\geometry{textwidth=7cm}
\geometry{paperwidth=140mm, paperheight=105mm}

\newgeometry{left=3cm,bottom=0.1cm}
...
\restoregeometry
```

Change margins in text:

```
\usepackage{changepage}
\begin{document}
    ...
\begin{adjustwidth}{<left>}{<right>}
    ...
\end{adjustwidth}
```

Custom environment to change margins in only a portion of text; it will indent the left and right margins by the values given.

```
\newenvironment{changemargin}[2]{%
 \begin{list}{}{%
  \setlength{\topsep}{0pt}%
  \setlength{\leftmargin}{#1}%
  \setlength{\rightmargin}{#2}%
  \setlength{\listparindent}{\parindent}%
  \setlength{\itemindent}{\parindent}%
  \setlength{\parsep}{\parskip}%
 }%
\item[]}{\end{list}}
```

Leave sections and headers alone, and reduce the margins of regular text? Increase subsection margins halfway.

Add notes to margins: can use marginnote (with package) or marginpar (no package needed). Not sure which is better yet.

```
\marginpar{Text in margin}
```

Or for more flexibility:

```
\usepackage{marginnote}
\usepackage{showframe,marginnote}  % box around margins
\setlength{\marginparwidth}{1in}

% ??
\renewcommand*{\raggedleftmarginnote}{}
\renewcommand*{\raggedrightmarginnote}{\centering}

\renewcommand*{\marginfont}{\color{red}\sffamily}

\begin{document}
\marginnote{<right>} % aligned left (ragged right)
\marginpar{<right>} % aligned left (ragged right)
\reversemarginpar  % Switch to left side margins
\marginnote{<left>} % aligned right (ragged left)
\marginpar{<left>}  % aligned left (ragged right)
\normalmarginpar  % switch back

% Example:
\hspace{0pt} % Put note next to section title text, rather than above it,
% which is done by default for some stupid reason
\reversemarginpar
\marginnote{}

\usepackage{schemata}
\schema[open|close]{body text}{margin text}
```

6.2 Horizontal spacing and alignment

- `\setlength{\parindent}{0m}` Set indent for new paragraphs
- `\hspace` horizontal space
- `\hspace{20 mm}` horizontal blank space equal to 20 mm
- `\hfill` Pad with horizontal space to end of line
- `\noindent` self-explanatory

alignment	environment	command
left	flushleft	`\raggedright`
right	flushright	`\raggedright`
center	center	`\centering`

```
\,
\thinspace
```

```
\! negative thin space
\: medium space
\; large space
\enspace
\quad
\qquad
\hspace{n_units}
\hfill
\hspace*{\fill}
```

```
\usepackage{ragged2e}
```

- `\begin{flushright}...\end{flushright}`
- `\begin{center} ... \end{center}`
- `\begin{justify} ... \end{justify}`
- `\centering`
- `\center` is not a thing.

7. Vertical spacing and alignment

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

- `\setlength{\parskip}{0.5ex}` Set spacing between paragraphs
- `\vspace{}` vertical space
- `\renewcommand{\baselinestretch}{1.5}`
  This changes the spacing for everything in the document, including footnotes and tables.
- `\usepackage{setspace}...\setstretch{1.5}`
  Can apply this to only part of text?
- `\usepackage[doublespacing]{setspace}` Same as previous option?

`[ctb]` Options like this will center at top, center, bottom, etc. Actually this usually doesn't work.

Vertical space commands won't work if they're part of a horizontal line. E.g. `\vfill` and `\vspace` need a line break before, and there needs to physically be something on either end between which the space is placed. A `\newpage` doesn't count. Use `\null` if there is nothing, e.g. `\newpage \null \vfill ...`

8. Breaking up text (or preventing it)

- `\\` Force line break
- `\newline` Same as `\\`, but more vertical blank space?
- `\newpage` Jump to a new page after previous section
- `\clearpage` Same as newpage, but also restricts floats: useful for placing figures where you want them (had to put this before and after each deluxetable in aastex).
- `\begin{samepage}... \end{samepage}` Prevent something from being split by a page break.

9. Headers and footers

In preamble:

```
\usepackage{fancyhdr}
\pagestyle{fancy}   % Automatically generates a header with section name
\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 13.6, otherwise will get an error message. Document still compiles, but better safe than sorry. Setting the left, center, and/or right headers overwrites the one generated automatically.

9.1 Page numbers

```
\pagenumbering{gobble}
\pagestyle{empty}
% Difference?

\fancyhf{} % Clear all headers and footers (including default page number).
\renewcommand{\headrulewidth}{0pt} % remove the header rule
\rfoot{\thepage}
\lfoot{\thepage}
```

9.2 Footnotes

```
\usepackage[stable,symbol]{footmisc}   % stable: put footnotes in section titles!
                                       % symbol: Use symbols instead of numbers

\usepackage{perpage}
\MakePerPage{footnote}          % Markers re-start after each page
...
\begin{document}
...
Here is some relevant information\footnote{See Guy et al. for additional
information.}
```

Here is some relevant information[1]

```
\renewcommand{\footnoterule}{%
  \kern -3pt
  \hrule width \textwidth height 1pt
  \kern 2pt
}
```

or

```
\renewcommand\footnoterule{\rule{\linewidth}{5pt}}
```

[1] See Guy et al. for additional information.

10. Fonts

- https://www.tug.org/pracjourn/2006-1/schmidt/schmidt.pdf
- https://en.wikibooks.org/wiki/LaTeX/Fonts

Font that applies to entire doc.

```
\usepackage{lmodern}
\renewcommand\familydefault{\sfdefault} % base font of the document
\renewcommand*\familydefault{\sfdefault} % Difference from above??
\usepackage[T1]{fontenc}
```

10.1 Font size

https://en.wikibooks.org/wiki/LaTeX/Fonts

10pt is the default font size.

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

The baseline-skip should be set to roughly 1.2x the font size.

```
\fontsize{<size>}{<baselineskip>}\selectfont
```

Example:

```
{\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).
Can also use environments:

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

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

10.2 Font style

10.2.1 Modal

These don't read text as an argument, and can somehow be used in the verbatim environment?

```
\mdseries
\bfseries
\upshape
\itshape
\scshape
\slshape
\rmfamily
\sffamily
\ttfamily
```

10.2.2 Textblock

```
\textbf{bold}
\textit{italics, for quotes or titles}
\texttt{computer style}
\textsf{sans serif}
\textsl{slanted}
\textsc{Small caps}
\emph{This text is also in italics, for emphasis}
\underline{This text is underlined}
\sout{This text is crossed out}
% with \usepackage{ulem}
```

bold
italics, for quotes or titles
`computer style`
sans serif
slanted
SMALL CAPS
This text is also in italics, for emphasis
This text is underlined ~~This text is crossed out~~

11. Sections

https://www.sharelatex.com/learn/Sections_and_chapters#Numbered_and_unnumbered_sections

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

11.1 Example of nested section settings

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

11.1.1 My subsubsection title

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

11.2 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. Note that `\paragraph{}` and `\par` are not the same thing. `\par` does the same thing as a blank line in the text file (starts a new paragraph).

```
\usepackage{titlesec}
\titleformat{<command>}
    [<shape>]{<format>}{<label>}{<sep>}{<before-code>}[<after-code>]
```

Shape:

`hang` (default)

`rightmargin, leftmargin` Titles are in the margins, rather than body of page.

Centers title horizontally, length of 1em between section number and text in title. Also customized how the titles should be labelled (#.#)

Labels:

```
\arabic (1, 2, 3, ...)
\alph (a, b, c, ...)
\Alph (A, B, C, ...)
\roman (i, ii, iii, ...)
\Roman (I, II, III, ...)
\fnsymbol (   ,    ,    ,   ,   , ...)
```

Examples:

```
\titleformat{\section}%
  {\fontsize{16}{18}\selectfont\bfseries\color{myblue}}
  {\fontsize{46}{50}\selectfont\color{mypur}\arabic{section}\color{black}$\vert$}
  {0em}{}
\titleformat{\subsection}%
  {\fontsize{14}{16}\selectfont\bfseries\color{mypur}}
  {\color{myblue}\circled{\arabic{section}.\arabic{subsection}}}
  {0.5em}{}
  [\vspace{-2.5pt}{\color{mygray}\titlerule[5pt]}]
  %[\vspace{-20pt}\colorbox{mygray}{% \begin{minipage}{\textwidth}% %\vspace*{2pt}%Space before \hfill %\vspace*{
\titleformat{\subsubsection}%
  {\fontsize{13}{14}\selectfont\bfseries\color{mypur}}
  {\color{myblue}\arabic{section}.\arabic{subsection}.\arabic{subsubsection}}
  {1em}{}
  [\vspace{-2.5pt}{\color{mygray}\titlerule[3pt]}]
\titleformat{\paragraph}%
  {\fontsize{12}{13}\selectfont\bfseries\color{myblue}}
  {}
  {0.5em}{}
```

`\par` can't be used to start a new line in `titleformat`, but `\\` and `\newline` can.

Note that this is only formatting the heading for sections, subsections, etc. They're not the start of an environment, so the following text isn't really connected to the headings. (Noted this when I was trying to format the section heading to make the text in that particular section a different color. You could set "after code" to change the text color, but you'd have to change it back further down the text).

11.3 Space around section titles

```
\usepackage{titlesec}
\titlespacing*{ command }{  left  }{ before-sep }{ after-sep }[ right-sep ]
\titlespacing*{\section}{-0.50in}{0pt}{0pt}[]
\titlespacing*{\subsection}{-0.25in}{0pt}{0pt}[]
\titlespacing*{\subsubsection}{-0.25in}{0pt}{0pt}[]
\titlespacing*{\paragraph}{-0.25in}{0pt}{0pt}[]
\titlespacing*{\subparagraph}{-0.25in}{0pt}{0pt}[]
```

The asterisk removes paragraph indentation following the section title (doesn't do anything if there is no indentation anyway). It also appears to allow you to set only a few options in titleformat without creating empty braces for every single argument (adds to existing title format, rather than starting from scratch...?) This is where you adjust vertical space. Don't try to do this in titleformat!

Add colon to end of all paragraph headings:

```
\newcommand\colonafter[1]{#1:}
\titleformat{\paragraph}%
  {\fontsize{12}{13}\selectfont\bfseries\color{myblue}}
  {}
  {0.5em}
  {\colonafter}
```

11.4 Simpler way to change only size/style

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

11.5 Color

The `sectsty` package can be used to set color, but be aware that it will override the `titlesec` package. There's probably no reason to use this.

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

11.6 Labels

```
\renewcommand{\thesection}{Text \arabic{section}}   % Text in front of label
\renewcommand{\thesection}{\Roman{section}}         % Roman numerals
\setcounter{secnumdepth}{0}                         % Depth to be labelled
```

Setting this to 1 would number sections only, setting it to 2 would number sections and subsections, but not subsubsections, etc.

```
\titleformat{\section}%
  vs.
\renewcommand{\thesection}%
  ??
```

First one starts from scratch, second just adds to what's already there?

11.7 Referring to sections in text using section labels

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

May need to run `pdflatex` twice for this to take effect. Obviously won't have anything to refer to if the sections aren't numbered.

12. Table of contents

http://texblog.org/2011/09/09/10-ways-to-customize-tocloflot/ http://tex.stackexchange.com/questions/37940/table-of-contents-with-roman-arabic-and-no-page-numbers

```
\usepackage{setspace} % Vertical space between toc items
\setcounter{tocdepth}{n} % n = number of levels deep to go, e.g.\ 1: sections, 2: sections and subsections, etc.

\usepackage[toc]{multitoc}
\renewcommand*{\multicolumntoc}{n}  % For n-column toc (default: n=2)
\setlength{\columnseprule}{0.5pt}   % With of Line (or blank space?) between toc columns

\usepackage{hyperref}  % required to make clickable links in toc.

...

\begin{document}
\addtocontents{toc}{\protect\setstretch{n}}
    % ''protect'' has something to do with ''fragile'' things.

\renewcommand{\baselinestretch}{<n>}\normalsize
    % n=2 for double spacing, 1 for single, 0.75 for compress.

\setlength{\parskip}{0pt}  % Another way to change spacing
\tableofcontents
\setlength{\parskip}{10pt}  % Spacing for remainder of document
```

You will have to run `pdflatex` twice. It appears that creating a toc puts headers on all pages, which may not be desired. See §9 for getting rid of them.

```
\renewcommand\contentsname{}
\tableofcontents
\renewcommand\listfigurename{}
\listoffigures
\renewcommand\listtablename{}
\listoftables
```

Some sections, like those with '*' won't be included. To add them:

```
% Syntax:
\addcontentsline{type}{section_level}{entry}
% Example:
\addcontentsline{toc}{section}{Preface}
```

Include figures and tables in table of contents:

```
\listoffigures
\listoftables
\setcounter{lofdepth}{2} % lof = list of figures
```

Note that the figure and table environments need to be used.

13. Lists

- ftp://ftp.nsu.ru/mirrors/ftp.dante.de/tex-archive/macros/latex/contrib/enumitem/enumitem.pdf
- https://www.ntg.nl/maps/11/33.pdf
- https://www.sharelatex.com/learn/Lists#Reference_guide
- http://ctan.mirrors.hoobly.com/macros/latex/contrib/enumitem/enumitem.pdf
- http://www.troubleshooters.com/linux/lyx/ownlists.htm

New (unorganized) stuff: "Label" refers to the bullet, number, or description item.

```
\begin{enumerate}[label=(\alph*)]
```

(a) item 1

(b) item 2

The asterisk connects the physical level of the list (in other words, second item down is marked 'b').

In preamble:

```
\usepackage{enumitem}
\setlist[<typeoflist>,<n>]{<options>}
```

`typeoflist` can be itemize, enumerate, description, etc. `n` is the nested level (1 for top level). Options are as follows:

Horizontal spacing

`labelindent` Appears to be the width between edge of text and left side of label. Default must be a negative number, since setting this to 0in aligns the labels with the text.

`labelwidth` Width allotted to the label. This should be equal to or greater than the longest expected label. Good for lining up text when labels are left-aligned. This will override labelindent if order is switched!

`labelsep` The distance between the rightmost part of the label (assuming you haven't changed the label from its default right justification) to the left margin of the item body. This is one of the handiest adjustments you can make to create the ultimately readable list for your exact situation. Use it early and often.

BEWARE: This setting enforces this distance by shoving the label left rather than moving the body left margin right. If you set this you might need to add a corresponding amount to `leftmargin`, if you want your labels in a specific place. Space between label and following text

`leftmargin` Distance from the left edge of the current environment (leftmost edge of labelwidth) to the left margin of the item label (not text?). Remember, environments can nest. Defaults to 0. Can only make this so big, eventually text doesn't move anymore. Need to figure out exactly what all this is doing. Pretty sure this only affects multi-line descriptions (the text NOT on the same line as the label).

`rightmargin` Change right margin of description text.

`listparindent` The indent of the first line of each paragraph in an item, except for the first paragraph of an item. If you're pressed for vertical space and want to decrease interparagraph spacing within items while still giving the user cues as where new paragraphs begin, this is the way to do it.

`itemindent` Only indents the first line (with the label) This length is capable of causing some real ugliness – leave it alone unless you have a really good reason not to. What this horrid adjustment does is takes the label and first line of a multiline body, and push them left from the normal item body left margin. This makes the body lines not line up. It's ugly. If you already have a list where multiline items look wrong, try setting this length to 0 to see whether a previous global setting of this length has caused problems.

Don't set this length except out of self-defense. It's trouble.

Vertical spacing

`parskip` Space between paragraphs outside of a list, and part of the space between a non-list paragraph and a list item. This is NOT a list property; it can be set globally for entire document (see SS `ref{}`).

`topsep` Extra space added to `parskip` before the first AND after the last item...bit of a misnomer.

`parsep` Paragraph separation within a single item.

`itemsep` Extra inter-item spacing added to `parsep`

`partopsep` This is added to the top and/or bottom of the list if and only if there's a blank line above or below the first or last item. Leave this alone unless blank lines become a problem.

Adjusting inter-item spacing:

- (without `enumitem` package):

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

- Even spacing in all lists and sub-lists:

```
\setlist{%
    noitemsep}
    % or ...
\begin{document}
\begin{itemize}[noitemsep]
```

13.1 itemize

Change bullet size/style. Not sure what the difference is between the two.

```
\renewcommand{\labelitemi}{$\vcenter{\hbox{\tiny$\bullet$}}$}
\renewcommand{\labelitemi}{{\tiny$\bullet$}}


%  arabic --> numbers
%  roman  --> roman numerals
%  alph   --> letters

\begin{itemize}[label={}]  % No label
```

13.2 enumerate

```
\setlist[enumerate]{font={\bfseries}}% global settings, for all lists
\setlist[enumerate,1]{label={(\arabic*)}}
\setlist[enumerate,1]{label={(\roman*)}}

\setenumerate[0]{label=(\Alph*)}


\begin{enumerate}
    \setcounter{enumi}{5} % Start at 5 instead of 1. This must be inside enumerate environment!
    \item ...
    \item ...
\end{enumerate}
```

1.1, 1.2 → 1.2.1,1.2.2, etc

```
\usepackage{enumitem}
\setlist[enumerate,1]{%
    label={\arabic{section}.\arabic*} }
\setlist[enumerate,2]{%
    label={\arabic{section}.\arabic{enumi}.\arabic*} }
```

Or use the `enumerate` package:

```
\usepackage{enumerate}
\begin{document}
\begin{enumerate}[label*=\arabic*.] % ???
\begin{enumerate}[I]
\begin{enumerate}[I.]
\begin{enumerate}[(a)]
```

13.3 description

To customize the description labels (the items inside the brackets), in the preamble:

```
\renewcommand{\descriptionlabel}[1]{%
    \hspace{\labelsep}
    \ttfamily
    \textcolor{red}{#1}
}
```

This puts the labels in typewriter font in a different color. By default, description labels start a distance equal to `hspace` to the left of the text, so adding that line causes them to line up with the left edge of the text instead.

```
align=right
leftmargin=*        % Align with main text... value affects text after the first line
font=\normalfont    % Not bold, which is the default
style=nextline      % Description starts on the next line
style=multiline     % ???
```

13.4 list

```
\begin{list}{default_label}{decls}
    default label: Text to be used as a label (leave blank if none desired)
    decls: geometrical parameters
```

13.5 tasks

```
\up{tasks}  % ???
...
\begin{tasks}(4)
    \task one
    \tast two
\end{tasks}
```

These will be listed horizontally, rather than vertically.

14. Colors

```
\usepackage{color}
\usepackage{xcolor}

% Applied to a small bit of text.
\textcolor[rgb]{0,1,0}{text}  % green

% applied to all following until color is changed again
%   or inside environment containing the statement
\color[rgb]{1,0,0} % red

\colorlet{<new color name>}{<old color name>}
\color{blue!30!green}  %    30% blue, 70% green
\color{blue!20!red!30!green}
% 0.20(0,0,1) + (1-0.20)(1,0,0) + 0.3(1,0,0) + (1-0.30)(0,1,0)
```

`color` is required for pre-defined colors (white, black, red, green, blue, cyan, magenta, yellow) `xcolors` is needed to define new colors (see § 14.3). The use of colour mixtures is a big addition brought along by xcolor. If you don't need the additional features of xcolor you can simply stick with color; even though there appears to be no disadvantage in using xcolor all the time.

14.1 Color background

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

14.2 Color text

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

14.3 Define your own colors

http://latexcolor.com

```
\usepackage[usenames, dvipsnames]{color}
 \definecolor{color}{HTML}{AF00D7} % HTML must be in caps!
 \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}.
```

15. Hyperlinks

In preamble:

```
\usepackage[breaklinks=true]{hyperref}
\hypersetup{
    colorlinks=true,
    urlcolor=blue,
    linkcolor=black
}
\urlstyle{same}
```

Insert hyperlink in text:

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

Link one word to another word

```
\hypertarget{word1_label}{\hyperlink{word2_label}{Word1}
...
\hypertarget{word2_label}{\hyperlink{word1_label}{Word2}
```

16. 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]

\colorbox{hl}{\parbox{0.9\textwidth}
text to go in box}
```

Simpler:

```
\usepackage{framed}
...
\begin{framed}...\end{framed}
```

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.

colorbox doesn't support line breaks...

http://mirrors.ibiblio.org/CTAN/macros/latex/contrib/tcolorbox/tcolorbox.pdf

```
\usepackage{tcolorbox}
\tcbset{
    colback=color,
    colbacktitle=color,
    colframe=color,
    coltitle=color,
    fonttitle={\Large\bfseries,nobeforeafter,center title},
    fontupper|fontupper=\fontsize{14pt}{16pt}\selectfont,
    width=4cm,
    height=8cm,
    boxrule=3mm, % width of all four sides
    toprule=3mm,
    bottomrule=3mm,
    leftrule=3mm,
    rightrule=3mm,
    arc=0mm, % Sharp corners
    boxsep=1.0in, % space between box edges and text
    sidebyside, % Divide left/right
    halign=center,
    valign=center,
}
...
\begin{document}
...
\begin{tcolorbox}[<options>]
    ...
    \tcblower % divide box into two sections, upper and lower
    ...
\end{tcolorbox}
```

Example:

```
\usepackage{tcolorbox}
\begin{tcolorbox}[colback=red!5!white,colframe=red!75!black,title=My nice heading]
    My awesome color box.
\end{tcolorbox}
```

17. Minipage

```
\begin{minipage}[<vertical align>][<height>]{<width>}
\raisebox{0pt}[<height>][<depth>]{...}
\begin{minipage}[t]{0.2\textwidth}
    stuff
\end{minipage}
\begin{minipage}[t]{0.8\textwidth}
    longer stuff
\end{minipage}
```

Use multicol package

```
\usepackage{multicol}
...
\begin{documnet}
...
\begin{multicols}{2}    % Start 2-columns
\begin{multicols*}{2}   % No forcing cols to equal heights
\raggedcolumns          % No forcing cols to fill vertical space

[
    \section{First section}
    Text that is not confined to declared columns. Not sure why you wouldn't
    just put this before starting the columns, but whatev.
]

\vfill                  % No forcing cols to fill vertical space (not working)
\columnbreak            % Start at top of next column

\addtolength{\columnsep}{5mm} % add space between columns
\setlength{\columnseprule}{0.4pt} % set thickness of line between columns
```

18. Symbols

```
\AA{}   % Angstrom (does not go 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)
\textbackslash  % \
\textgreater    % >
\textless       % <
```

some text

19. Lines

```
\hline % forces a break between paragraphs
\rule{length}{thickness} % Doesn't force break between paragraphs
```

```
\line(x-slope, y-slope){length}  % Syntax
\line(1,0){450}  % Example of hor. line... can't find anything that explains the units of 'length' :(
\dotfill
\hrulefill
```

20. Writing code into a Latex document

A nicer alternative to verbatim.

```
\usepackage{listings}
\usepackage{color}

\definecolor{mygreen}{rgb}{0,0.6,0}
\definecolor{mygray}{rgb}{0.5,0.5,0.5}
\definecolor{mymauve}{rgb}{0.58,0,0.82}

\lstset{ %
  backgroundcolor=\color{white},   % choose the background color; you must add \usepackage{color} or \usepackage{xc
  basicstyle=\footnotesize,        % the size of the fonts that are used for the code
  breakatwhitespace=false,         % sets if automatic breaks should only happen at whitespace
  breaklines=true,                 % sets automatic line breaking
  captionpos=b,                    % sets the caption-position to bottom
  commentstyle=\color{mygreen},    % comment style
  deletekeywords={...},            % if you want to delete keywords from the given language
  escapeinside={\%*}{*)},          % if you want to add LaTeX within your code
  extendedchars=true,              % lets you use non-ASCII characters; for 8-bits encodings only, does not work wi
  frame=single,                    % adds a frame around the code
  keepspaces=true,                 % keeps spaces in text, useful for keeping indentation of code (possibly needs c
  keywordstyle=\color{blue},       % keyword style
  language=Octave,                 % the language of the code
  otherkeywords={*,...},           % if you want to add more keywords to the set
  numbers=left,                    % where to put the line-numbers; possible values are (none, left, right)
  numbersep=5pt,                   % how far the line-numbers are from the code
  numberstyle=\tiny\color{mygray}, % the style that is used for the line-numbers
  rulecolor=\color{black},         % if not set, the frame-color may be changed on line-breaks within not-black tex
  showspaces=false,                % show spaces everywhere adding particular underscores; it overrides 'showstring
  showstringspaces=false,          % underline spaces within strings only
  showtabs=false,                  % show tabs within strings adding particular underscores
  stepnumber=2,                    % the step between two line-numbers. If it's 1, each line will be numbered
  stringstyle=\color{mymauve},     % string literal style
  tabsize=2,                       % sets default tabsize to 2 spaces
  title=\lstname                   % show the filename of files included with \lstinputlisting; also try caption in
}
...
\begin{lstlisting}
    code code code
\end{lstlisting}
```

21. New and renewed commands and environments

21.1 Commands

Syntax: `\newcommand{<cmd>}[<n>][<opt>]{<stuff>}`

`n` Number of arguments

`opt` Options

`stuff` stuff

Existing environments (list, adjustwidth, etc.) can be used inside new commands!

21.2 Environments

```
\renewenvironment{name}{%
    ...}

\newenvironment{name}[#]{%
    {<initialization code> (before text)}
    {<finalization code> (after text)}
}
```

22. Verbatim

`verb` is used "in line", while `verbatim` is a separate environment:

```
\begin{verbatim}
... text ...
\end{verbatim}


\verb|\documentclass{article}|
```

How to make the begin verbatim text a different color in vi? E.g. a dark gray, but the enclosed text is lighter.

23. Figures

```
\usepackage{graphicx} % Not needed with Beamer? Seems to be needed to set graphicspath
\graphicspath{{/path/to/graphics/}}
\usepackage{float} % manage floating graphics
...
\begin{figure}[<placement specifier(s)>]
\centering
\includegraphics[<options>]{GreekSymbols.jpg}
\caption{How to insert greek symbols in LaTeX}
\label{greek}
\end{figure}
```

Options:

- width=5.0in
- draft=true—false
- angle=90—180—etc...

Note:

```
See figure \ref{figlabel}
  vs.
See figure~\ref{figlabel} % prevents "figure" and number from being separated at a line break.
```

Placement specifiers:

`t` Top

`b` Bottom

`p` Page of floats

`h` Here, if possible

`H` Here, definitely

`!`

LaTeX thinks it knows where to put your figures better than you do…

Note that placement specifiers are for floating figures. If you're using, e.g. the deluxetable environment with aastex, these options won't work (you'll actually get an error).

24. Tables

```
\renewcommand{\arraystretch}{2}  % Apply doubling spacing between table rows, if desired
\setlength{\tabcolsep}{12pt}  % Add space between columns
\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.

```
\begin{tabular{r p{6in}}
    one & two \newline more text
\end{tabular}
  % p = top alignment
  % b = bottom alignment
  % m = center alignment
```

The `p/b/m` options are "paragraph options". They're left-aligned, let you set the width of the cell so that long text will wrap nicely, and allow the use of `\newline` in the tabular environment, if needed.

25. Bibliographies

Bibtex - entries are stored in a separate file, `reffile.bib`, then imported into the main document. This file is formatted like `@article{id,...}` (so not a aastex thing). Bibtex is NOT a package that needs to be loaded.

```
\bibliographystyle{plain}
\begin{document}
... \cite{id} ...
\bibliographystyle{plain}  % This can go here or in the preamble
\bibliography{reffile}
\end{document}
```

Natbib - this is a package.

```
\usepackage{natbib}
%% In text citations:
\citet[p.~199]{label} % cite specific page
\cite{label1, label2} % 1+ papers by same author
\citealt{label} % ?

\bibliographystyle{te} % te - one of many formatting styles; optional?
\bibliography{research} % create list from research.bib
```

26. Labels and cross-references

```
\label{ssub:labelname}...\ref{ssub:labelname}
\label{fig:labelname}...\ref{fig:labelname}
```

In case same name is used for multiple things. Also requires multiple runs of pdflatex.

27. Maths!

http://www.math.harvard.edu/texman/node17.html http://www.math.illinois.edu/~ajh/tex/displays.html

27.1 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

27.2 Equations

27.2.1 Numbered equations

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

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

27.2.2 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. Apparently it is now best to use brackets rather than $$s:

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

27.2.3 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*}
```

27.3 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.

27.4 Arrays

```
\[ \left\{
    \begin{array}{l c r c l}
        x & y & z \\
    \end{array}\right.
    \]
```

27.5 Superscripts, subscripts, and prescripts

```
\[
    \sum_{\mathclap{j=1}}x  % \usepackage{mathtools}
    \prescript{238}{92}{U}
    \]
```

$$\sum_{j=1} x \qquad {}^{238}_{92}U$$

27.6 Referring to parts of equation

http://tex.stackexchange.com/questions/261315/how-to-change-color-of-underbrace

```
\usepackage{amsmath}
...
\begin{document}
...
\<command>[<width>][<depth>]{<stuff>}
```

Possible commands:

underbrace
overbrace
underbracket
overbracket

```
\usepackage{mathtools}
\usepackage{ragged2e}
\newlength\ubwidth
\newcommand\parunderbrace[2]{%
    \settowidth\ubwidth{$#1$}
    \underbrace{#1}_{\parbox{\ubwidth}{\scriptsize\RaggedRight#2}}}
```

Example:

```
$\underbrace{P(X \mid O)}_{p_1} \propto \overbrace{P(X)P(O \mid X)}^{p_2}$\\
$\underbrace{P(X \mid O)}_{\text{This explains this part}}
\propto \overbrace{P(X)P(O \mid X)}^{\text{And this explains the other part}}$
```

$$\underbrace{P(X \mid O)}_{p_1} \propto \overbrace{P(X)P(O \mid X)}^{p_2}$$

$$\underbrace{P(X \mid O)}_{\text{This explains this part}} \propto \overbrace{P(X)P(O \mid X)}^{\text{And this explains the other part}}$$

27.7 Operations

27.7.1 Integrals

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

27.7.2 Square root

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

27.7.3 Summation (and the multiplication version)

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

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

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

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

28. Questions and things to be added

Could make a new environment using `\tt` for stuff that doesn't apply to latex itself...
In `think_python.tex`, add part for using straight single quotes in verbatim environment.