LaTeX for LaTeX's sake

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Contents

Chapter 1

The Basics

1.1 Frequently Used

1.1.1 Geometry and Spacing

```
%------------ Word---------
\usepackage{geometry}
\geometry{left=1.25in,right=1.25in,top=1in,bottom=1in}

%------------ spacing ----------
\renewcommand{\baselinestretch}{1.25}  % global
% --------------------
\usepackage{setspace} % local
\begin{spacing}{1.5}
        % content here
\end{spacing}
```

See also Paragraph, Section Title and ToC Style

1.1.2 Hyperlinks

```
\usepackage[colorlinks]{hyperref}  % all magenta
%----------------------------
\usepackage[hidelinks=true]{hyperref} % suppress box
%----------------------------
\usepackage[colorlinks,linkcolor=black]{hyperref} % urlcolor=blue
%----------------------------
\input{mypack/RWhrefStyle} % Robin Williams href style
```

1.1.3 Colors

```
\usepackage{color,xcolor}
\definecolor{stanford}{RGB}{140,21,21}
\definecolor{mygray}{rgb}{.6,.6,.6}
\colorlet{myemphcolor}{stanford}
%\textcolor{color}{content}

\newcommand{\Emph}[1]{\textcolor{myemphcolor}{\textbf{#1}}}
```

See also My Colorbank

1.1.4 Code and Stickers

Package Minted

```
% for compiler options, see this add --shell-escape -8bit
\begin{minted}{cpp/python/latex/...}
        % write some code
\end{minted}

% customized environment to beautify
\newenvironment{mymint}[1]
{\setmonofont{Consolas}\VerbatimEnvironment
        \begin{minted}[breaklines,tabsize=4,escapeinside=]{#1}}
{\end{minted}}

% usage
\begin{mymint}{python/cpp/latex...}
        % code here
\end{mymint}
```

See also Intro Official

My Code Environment

```
\input{mypack/LanEnv/latexenv} % cpp,python,java,bash,matlab
%\input{mypack/LanEnv/allenv} % not freq used after minted

% code block
\begin{cpp/java/python/matlab/latex/bash}
        % code here
```

```
\end{cpp/java/python/matlab/latex/bash}

% code in line
\cppinline{code here} % java,python,latex...
```

My Stickers System

```
\input{mypack/includestickers} % susceptible to path change!
\addemotion{\hh}{hh} % use \hh for hh.png
```

	\hh\ganga\tongue\jingxi\xk\emcry
	\love\danding\one\two\mobai\xmas
	\ka\hx\kiss\wx\qiaoda\cool
	\wozuimei\maimeng\wunai\tianshi\sweet\pat\xiongmao

See also Apple emoji

1.2 Texts and Fonts

1.2.1 The Basics

Declarations: rmfamily sffamily ttfamily **bfseries** *itshape* *slshape*
Commands: textrm TEXTSC texttt **textbf** *textit* *textsl*
Size: tiny scriptsize footnotesize small normalsize large Large LARGE huge Huge

1.2.2 Font Change

```
% find font name in Control Panel
%------------ English ------------
\usepackage{fontspec}
\setromanfont{Palatino Linotype}
\setmainfont{Adobe Jenson Pro}
\setsansfont{San Francisco Text}
\setmonofont{Consolas}   % Courier New

%------------ Add new-------------
\newfontfamily{\ubuntu}{Ubuntu}

%------------ Chinese ------------
\usepackage{xeCJK}
```

```
\setCJKsansfont{PingFang SC Regular}

% for novels: Source Han Serif SC Light
```

1.2.3 Text Control

```
%\centering \flushleft \flushright

% ~ space  \, \; small-space \quad \qquad larger-space  \phantom{}
% \\  \par  \newpage  \noindent

\vspace{-1pt} \hspace{1mm} precisely adjust

% \hfill  \vfill \mbox{} ignore small spaces, not breakline-able
```

1.3 Graphs and Tables

1.3.1 Graphs

```
% ------------ Basic ------------------
\usepackage{graphicx}
\centering\includegraphics[scale=0.4]{pic.png}

% ------------ Classic ------------------
\begin{figure}[h]
        \centering
        \includegraphics[scale=0.5]{apple.jpg}
        \caption{This is an apple.}
        \label{fig:g1}
\end{figure}

% width=.5\textwidth,angle=90,height=4cm,trim=...
% H stands for 'exactly here', require \usepackage{float}
```

See also Inserting graphs

1.3.2 Tables

```
% ------------- Aligned env ------------
\begin{tabular}{ll}
        &   \\
        &
\end{tabular}

% ------------- Classic ----------
\usepackage{booktabs}

\begin{table}[htbp]
        \caption{}
        \centering
        \begin{tabular}{lll}
                \toprule
                 &  &   \\
                \midrule
                 &  &   \\
                 &  &   \\
                \bottomrule
        \end{tabular}
        \label{}
\end{table}
% {tabular}{lcl|r}
```

1.3.3 Juxtaposition

```
% NO breakline between two minipages if want to juxtapose
% OR will be considered as separate -> result in vertical

\begin{minipage}[t/c/b]{.5\textwidth}
        \begin{centering}
                % graphic,tabular,code etc
        \end{centering}
\end{minipage}
\begin{minipage}[t/c/b]{.5\textwidth}
        % content
\end{minipage}
%[t/c/b] 对齐方式top/center/bottom
```

See also 2×2 graph juxtaposition

1.4 Math

1.4.1 Some Tricks

```
\usepackage{amsmath,amssymb,mathtools}

% ---------- Vectors ------------
\newcommand {\x}{\V{x}}
\newcommand {\V}[1]{\mbox{\boldmath1}}

% ---------- Misc ---------------
\text{} % escape math env

\left( content \right) % dynamic sized envelopes
\newcommand{\br}[1]{\left(#1\right)} % \br{} to simplify

% Numbered environment defined with Newtheorem
\usepackage{amsmath}
\newtheorem{SampleEnv}{Sample Environment}[section]
```

1.4.2 My Table of Math Symbols

$\geqslant\leqslant$	`\geqslant\leqslant`
$\min\limits_{\overrightarrow{W},b}$	`\mathop{\min}\limits_{\overrightarrow{W},b}`
$\sum\limits_{i=1}^{n} \prod\limits_{j=1}^{m} \int_0^\infty$	`\sum\limits_{i}^{n} \prod \int`
$\boldsymbol{x}^\intercal \in \mathbb{R}^N$	`\mbox{\boldmath$x$}^\intercal\in\mathbb{R}^N$`
$\to\mapsto\leftarrow\Rightarrow$	`\to\mapsto\leftarrow\Rightarrow`
$\neq\approx\sim\propto\in\ni$	`\neq\approx\sim\propto\in\ni`
$\cdot\times\cup\cap\subset\supseteq$	`\cdot\times\cup\cap\subset\supseteq`

1.4.3 Editing Formulas

```
%-------------- Basic -------------
\begin{equation}\label{}
        % ...
\end{equation}

%-------------- Aligned -------------
\begin{eqnarray}
```

```
        a+b & = & 1 \\
        a-b & = & 8.
\end{eqnarray}

%-------------- Long -----------------
\begin{multiline*}
        cont\\...\\ent
\end{multiline*}
```

Complicated Formulas

$$i\hbar\frac{\partial\psi(r,t)}{\partial t} = \begin{cases} [-\frac{\hbar^2}{2m}\nabla^2 + V(r)]\psi(r,t), & \text{if } n_{ij} = 0 \\ \prod_{t=0}^{T}(t_l \neq 1)\sqrt[3]{e^{i\pi}+1}, & \text{if } n_{opt} > 0 \end{cases}$$

Matrices

$$\boldsymbol{x} \coloneqq \begin{pmatrix} D_{1,2} \\ \vdots \\ D_{48,49} \\ p_s \end{pmatrix} = \begin{bmatrix} 1 & 2 & \cdots & 4 \\ 7 & 6 & \cdots & 5 \\ \vdots & \vdots & \ddots & \vdots \\ 8 & 9 & \cdots & 0 \end{bmatrix}$$

1.5 Beamer

1.5.1 Structure

```
% Chinese Serif font Beamer Style
\input{mypack/ChRmBeamerStyle}
\title \author \date \institute

\usetheme{AnnArbor}
% \usecolortheme{Beaver}
```

See also Beamer Intro Theme Matrix My template collection

1.5.2 Frequently-used Code

```
\alert{} % highlight

 %-----------splitting --------------
\begin{columns}
        \column{.5\textwidth}
```

```
                % content
        \column{.5\textwidth}
                % content
\end{columns}

%---------- insert code ------------
\begin{frame}[containsverbatim]
        % listing-based environment here
\end{frame}
```

1.5.3 Font Settings

```
 %------------ Serif Math----------
\usefonttheme[onlymath]{serif}

%------------ Adjust item symbol ----------
\setbeamertemplate{items}[ball]
\setbeamertemplate{itemize items}{\color{red}$\bullet$}
```

1.6 Citations

1. Find BibTeX citation for article, copy to ref.bib.
2. In preamble, put`\bibliographystyle{option}`. Option `unsrt` for order appeared in article, `plain` for conventional.
3. Use `\cite{bibid}` to cite article, use `\ref{label}` for labels in graphs, tables or equation, use `\hyperref[label]{text}` to attain similar effect of `\href`
4. Put `\nocite{*}` at end of file to list all references that has not been cited.
5. Put `\bibliography{ref}` in end of file.

Chapter 2

Advanced and Aesthetic

2.1 Macro and Abstraction

2.1.1 The Basics

```
% ---------- newcommand---------------
\newcommand{\name}[num]{definition}
\newcommand{\name}[num][default]{definition} % general
% \name[opt.#1]{#2}{#3}... when executed
\renewcommand  % override existing

% ---------- newenvironment---------------
\newenvironment{name}[num][default]{before}{after}

% ---------- newcommand ex ---------------
\newcommand{\R}{\mathbb{R}} % \a <- \alpha
\newcommand{\bb}[1]{\mathbb{#1}}
\newcommand{\Partial}[2][x]{\frac{\partial #2}{\partial #1}}
% #1 default, \Partial{y} = py/px,  \Partial[t]{y} = py/pt
% vecs, conditional probabilities similar

% ---------- newenvironment ex ---------------
\newenvironment{myquote}
{\begin{quote}\kaishu\zihao{-5}}
{\end{quote}}

\renewenvironment{boxed}[1]
{\begin{center}
                #1\\[1ex]
                \begin{tabular}{|p{0.9\textwidth}|}
                        \hline\\
```

```
                }
                {
                        \\\\\hline
                \end{tabular}
        \end{center}
}
```

2.1.2 History Macros

```
% testing font effect, in between \csname seems to be a command
\newcommand{\FontTest}[1]{{ \csname#1\endcsname{#1}}}

% nested command in adding stickers, '%' in end for protection
\newcommand{\addsticker}[2]{%
        \newcommand{#1}{%
                \raisebox{-.4ex}{\protect\includegraphics[height=2.5
ex]{stickers/#2.png}}}%
}

% resolving verbatim trap, use \VerbatimEnvironment
\newenvironment{mymint}[1]
{\setmonofont{Consolas}\VerbatimEnvironment%
        \begin{minted}[breaklines,tabsize=4,escapeinside=]{#1}}
{\end{minted}}

% add \hspace or \vspace to change space setting
\newcommand{\latexinline}[1]{{\Lastyle\hspace{-0.5em}\lstinline!#1!}}
```

See also Nested command

2.1.3 Document Styles

Customized Styles

```
% ------------- Section title -------------
\usepackage{titlesec}
\definecolor{darksteelblue}{RGB}{49,91,125}
\titleformat*{\section}{\centering\Large\bfseries\sffamily\color{
darksteelblue}}
\titleformat*{\subsection}{\large\bfseries\sffamily\color{
darksteelblue}}
```

```
\titleformat*{\subsubsection}{\normalsize\bfseries\scshape\color{
darksteelblue}}

% ------------- Par indent ------------
\setlength{\parindent}{0pt}
\setlength{\parskip}{1em}

% ------------- Content level ------------
\setcounter{secnumdepth}{4} % number depth default 3
\setcounter{tocdepth}{4} % default 3
\addcontentsline{toc}{section}{Title} % add to toc manually
% 'section' indicate the target level is same with normal section
```

2.2 Functional typesetting

2.2.1 Novels

Environment Configuration

```
\documentclass[oneside,UTF8,12]{ctexbook}
\usepackage{geometry}
\geometry{left=1.5cm,right=1.5cm,top=1.55cm,bottom=1.55cm}
\paperheight 18.4 true cm \paperwidth 13 true cm
\textheight 15.3 true cm \textwidth 10 true cm
\setCJKmainfont{Source Han Serif SC Light} % 思源宋体
\maketitle
\tableofcontents
\input{file} % 1.5 spacing
```

See also Font website An off-the-shelf template for English novels

Generating ToC

`\addcontentsline` allow adding content we choose to ToC, and `\phantomsection` enables positioning.

```
\phantomsection \addcontentsline{toc}{section}{My Title}
\section*{My Title}
```

General Framework for Python words processing:

```
import re
path = r'input.txt'
```

```
dest = r'output.txt'

fr = open(path, 'r', encoding='gbk',errors='ignore')
fw = open(dest,'w',encoding='gbk')
lines = fr.readlines()

for line in lines:
    if ... else ...
fr.close()
fw.close()
```

To change all title to the desired form, we need

```
title_list = ['Sec1','Sec2','Sec3',...]

for line in lines:
    if line.strip() in title_list:
        new_line = r'\phantomsection \addcontentsline{toc}{section}{' +
        ↪  line.strip() + '}' + '\section*{' + line.strip() + '}'
    else:
        new_line = line
    fw.write(new_line)
```

Trash Filtering

Breaklines Change the two-spaced normal text to LaTeX readable form by adding ~\\ at front of each paragraph.

```
p1 = re.compile(r'^\s\s')

for line in lines:
    res = re.findall(p1, line)
    if res != []: # if pattern found
        new_line = r'~\\1' + line
    else:
        new_line = line
    fw.write(new_line)
```

History codes

```
# ---------------- used regex ----------------
GRE: (r'\d\.') (r'[ABCDE]\.') (r'Passage\s\d+')
Fiction: (r'^ 第\s\d+\s 页')    (r'^\\par\s+(一 | 二 | 三 | 四 |...| 十
↪  八)S') # dollar sign

if line != '\n': # empty line
```

```
# ----------------------------
new_line = r'~\\' + line + r'\\~\\' # 空两行
# ----------------------------
res2 = re.findall(p2,line)    # re.findall and replace
if res2 != []:
    new_line = line.replace(res2[0],'')
```

2.3 Coloration Advanced

2.3.1 Package Tcolorbox

tcolorbox is elegant in visual and convenient to use, but too much boxes can slow down the PDF reader.

See also Intro Official

```
\usepackage{tcolorbox}
%\tcbuselibrary{skins, breakable, theorems,minted}

\begin{newtcolorbox}{title} % one-color box
\begin{newtcolorbox}[title=...] % charcoal frame two-color box

% self-defined box, mix background with white, frame with shade
% 5% color and white inside, 60% color and 40% black for border
\newtcolorbox{myboxA}[2][red]{title=#2,colback=#1!5!white,
        colframe=#1!60!black!}


\begin{myboxA}[anycolor]{title}
        % content here
\end{myboxA}
```

2.3.2 My Colorbank

Collecting ingenious use of colors for later reference.

```
\definecolor{stanford}{RGB}{140,21,21} % emph dark red
\definecolor{mygray}{gray}{.6} %  comment gray

\definecolor{darksteelblue}{RGB}{49,91,125} % ink blue for title

%------------ Arcteryx grey and red ------------
\definecolor{arcgrey}{RGB}{245,250,251}
```

```
\definecolor{arcred}{RGB}{195,3,75}

%————————————— Robin Williams tri—ad for hreflinks ———————
\definecolor{YellowOrange}{RGB}{249,176,115}
\definecolor{Violet}{RGB}{164,102,147}
\definecolor{Aquamarine}{RGB}{111,170,179}

\colorlet{actual}{above!85!black} % mixture of 15% shade

% ———————————————— Grays ———————————————————
\definecolor{charcoal}{gray}{.25} % dark gray
\definecolor{lightgray}{gray}{.97} % wechat background gray

\usepackage[dvipsnames]{xcolor} % 68 predefined colors
```

Chapter 3

Buffer Zone

3.1 Level I

```
% char rotation
\rotatebox[origin=c]{345}{\small\emo}

% letterhead logo,\includegraphic preciser than PS
{\par \setlength\parindent{0em} \includegraphics[scale=0.3,trim=0 100
0  60, clip]{NJU.jpg}}

% ----------  rules ------------
\noindent{\color{red}\rule{\linewidth}{0.5mm}}

% ------------
\documentclass[12pt]{article} % only 10pt, 11pt, 12pt

% CJK-Chi,Jap,Kor for Europeaan, inputenc babel
```

3.2 Level II

3.2.1 Customize Itemize Environment

```
\usepackage{enumitem}
\begin{enumerate}[label={(\arabic*)}] % (1) (2) (3)···

% ---------- beamer change item symbol --------------
\setbeamertemplate{items}[ball]
\setbeamertemplate{itemize items}{\color{red}$\bullet$}
```

3.3 Further Links

Problem Solving Procedure Problem → Baidu → TEXExchange → CTAN Documentation

Some Websites LATEX 开源小屋 Overleaf Documentations

Beamer Templates Skyblue Rouge and Noir Another one

Other Libros Colored Sheet Comprehensive book LATEX reference in Math from Columbia