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 style ----------
\usepackage{geometry}
\geometry{left=1.25in,right=1.25in,top=1in,bottom=1in}

%------------ line spacing ----------
\renewcommand{\baselinestretch}{1.25} % global

\usepackage{setspace}
\begin{spacing}{1.5}
        % content here
\end{spacing}
%------------ paragraph indentation
\setlength{\parindent}{0pt}
\setlength{\parskip}{1em}
%------------ shift title ------------
\usepackage{titling}
\setlength{\droptitle}{-15ex}
```

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
```

1.1.3 Colors

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

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

\documentclass[dvipsnames]{beamer}
\usepackage[dvipsnames]{xcolor} % import standard color
```

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

Pistachio's Code Environment

```
\input{mypack/LanEnv/latexenv} % cpp,python,java,bash,matlab

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

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

Pistachio's Stickers System

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

\newcommand{\addsticker}[2]{%
        \newcommand{#1}{%
                \raisebox{-.4ex}{\protect\includegraphics[height=2.5
ex]{stickers/#2.png}}}%
}

\addsticker{\party}{party}
\addsticker{\rose}{fa}
```

😄😅😝😃😂😭	\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

Notice If recent installed font cannot be compiled into TEX, try import .ttf font files manually under`C:\texlive\2017\texmf-dist\fonts\truetype`, other .otf font files under`fonts\opentype`.

```
% 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}
```

1.2.3 Text Manipulation

```
%\centering \flushleft \flushright
% spaces: ~  \, \; \quad \qquad \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}

%------------- Enable table commenting --------------
\usepackage{threeparttable}
\begin{table}
        \caption
        \centering
        \begin{threeparttable}
                \begin{tabular}{lll}
                        & &
                \end{tabular}
```

```
                \begin{tablenotes}
                        \footnotesize
                        \item[1]
                        \item[2]
                \end{tablenotes}
        \end{threeparttable}
\end{table}
```

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] alignment: 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

$\geqslant\leqslant\nRightarrow\Leftrightarrow$	`\geqslant\leqslant\nRightarrow\Leftrightarrow`
$\min\limits_{\overrightarrow{W},b}$	`\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$`
$\to\mapsto\leftarrow$	`\to\mapsto\leftarrow`
$\xrightarrow[\text{world}]{\text{hello}}\xRightarrow[\text{world}]{\text{hello}}$	`\xrightarrow[]{}\xRightarrow`
$\neq\approx\sim\propto\in\ni$	`\neq\approx\sim\propto\in\ni`
$\cdot\times\cup\cap\subset\supseteq$	`\cdot\times\cup\cap\subset\supseteq`
$\underbrace{aa}_{2}\overbracket{bb}^{3}$	`\underbrace{aa}_{2}\overbracket{bb}^{3}`

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
\usepackage[UTF8,noindent]{ctexcap}
\usepackage[utf8]{inputenc}

\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

%----------Column splitting ------------
\begin{columns}
        \column{.5\textwidth}
        % content
        \column{.5\textwidth}
        % content
\end{columns}

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

```
%---------- auto-break frame ----------
\begin{frame}[allowframebreaks]{References}
        \bibliographystyle{plain}
        \bibliography{ref}
\end{frame}
```

1.5.3 Font Settings

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

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

1.5.4 Self-defined Beamer

Footer

```
% 3 - column footer bar
\setbeamertemplate{footline}
{
        \leavevmode%
        \hbox{%
                \begin{beamercolorbox}[wd=.333333\paperwidth,ht=2.25ex,dp=1ex
,center]{author in head/foot}%
                        % \usebeamerfont{author in head/foot}
\insertshortauthor
                        Zizhou Sang
                \end{beamercolorbox}%
                \begin{beamercolorbox}[wd=.333333\paperwidth,ht=2.25ex,dp=1ex
,center]{title in head/foot}%
                        \usebeamerfont{title in head/foot}\insertshorttitle
                \end{beamercolorbox}%
                \begin{beamercolorbox}[wd=.333333\paperwidth,ht=2.25ex,dp=1ex
,right]{date in head/foot}%
                        %\usebeamerfont{date in head/foot}\insertshortdate{}
                        Mar 26, 2019
                        \hspace*{2em}
                        \insertframenumber{} / \inserttotalframenumber\hspace
*{2ex}
```

```
                \end{beamercolorbox}%
        }%

        %       \hbox{%
        %               \begin{beamercolorbox}[wd=\paperwidth,ht=2.25ex,dp=1
ex,center]{back}%
        %               \end{beamercolorbox}%
        %       }%
        %       \vskip0pt%
}

% header
\setbeamertemplate{headline}{%
        \leavevmode%
        \hbox{%
                \begin{beamercolorbox}[wd=\paperwidth,ht=2.5ex,dp=1.125ex]{
palette quaternary}%
                        \insertsectionnavigationhorizontal{\paperwidth}{}{
\hskip0pt plus1filll}
                \end{beamercolorbox}%
        }
}
```

1.5.5 Footnote Citation

```
        % cite in form of footnote
        \usepackage[backend=bibtex,sorting=none]{biblatex}
        \addbibresource{ref.bib}
        \setbeamerfont{footnote}{size=\tiny}

        \footfullcite{bib_item}
```

1.6 Citations

1. Find BibTEXcitation 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 (to attach the ref.bib).

1.7 Configuration and Optimization

Accelerate Compiling

It might be slow to compile LaTeX for the first time, we can run `texlive/bin/fc-cache` with administrator.

Package minted

Need to set options from TeXStudio XeLaTeXto `xelatex.exe -synctex=1 -interaction=nonstopmode --shell-escape%.tex`

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}
```

2.3 Advanced Coloration

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 Pseudocode Environment

```
        \usepackage{algorithm,algorithmicx,algpseudocode}
        \renewcommand{\algorithmicrequire}{\textbf{Input:}}
        % Use Input in the format of Algorithm
        \renewcommand{\algorithmicensure}{\textbf{Output:}}
        % Use Output in the format of Algorithm
```

```
\begin{algorithm}[htb]
        \caption{Network generating}
        %\label{alg:Framework}
        \begin{algorithmic}[1]
                \Require  % will present as "Input"

                \Ensure  % will present as "Output"

                \State
                \If \Return
                \State
                \Else
                \State
                \EndIf
        \end{algorithmic}
\end{algorithm}
```

3.2.2 Page Settings

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

        %---------------- page color --------------------
        \pagecolor{color}  % global
        \definecolor{lightyellowishgray}{RGB}{244,244,234}

        \usepackage{framed} % local background
        \define{shadecolor}{gray}{}
        \begin{shaded}
                % content
        \end{shaded}

        %------------ page background ------------
        \usepackage[scale=1,angle=0,opacity=1,firstpage=true]{background}
        \newcommand\BackImage[2][scale=1]{%
                \BgThispage
                \backgroundsetup{
                        contents={\includegraphics[#1]{#2}}
        }

        \BackImage{wallpaper.png}
```

```
%---------- no page number ---------
\pagestyle{empty} % in preamble
\thispagestyle{empty} % right after \maketitle
```

3.2.3 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 LATEXOpen Source Site Overleaf Documentations

Beamer Templates Skyblue Rouge and Noir Another one

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