

L^AT_EX

Hajun Park

June 29, 2024

Contents

1	Code	3
1.1	verbatim	3
1.1.1	Inline code	3
1.1.2	Code block	3
1.1.3	Block comment	3
1.2	listings	3
1.2.1	Inline code	3
1.2.2	Code block	3
1.2.3	Input file	4
1.3	minted	4
1.3.1	Inline code	5
1.3.2	Code block	5
1.3.3	Input file	5
1.3.4	Captions and labels	5
1.3.5	Options	5
2	Split files	7
2.1	input	7
2.2	include	7
2.3	standalone	7
2.4	subfiles	7
3	Math	8
3.1	Text over and under symbols	8
3.1.1	Place text using <code>overset</code> & <code>underset</code>	8
3.1.2	Remove extra spaces with <code>mathclap</code>	8
3.1.3	Multiple lines with <code>substack</code>	8
3.1.4	Place arrows	9
3.1.5	Use long arrows with <code>\big</code>	9
3.2	Curly braces over and under equations	10
3.2.1	Inside square root or <code>\left</code> & <code>\right</code> parentheses etc.	10
3.2.2	Use <code>smash</code> to write explanation outside	11
3.2.3	Add vertical space	11
3.3	Vector notations	11
3.4	Derivative notations	11
3.4.1	Ordinary derivative	12
3.4.2	Partial derivative	12
3.4.3	Material derivative	12
3.4.4	Functional derivative	12
3.4.5	Average rate of change	12
3.4.6	Jacobian	12
3.5	Cancel	13
3.6	Multiline equations	13
4	Layout	14
4.1	geometry	14
4.1.1	Paper size	14
4.1.2	Margin size	14
4.1.3	Example	14
4.2	parskip	15

4.2.1	Options	15
4.2.2	Example	15
5	Path	16
5.1	currfile	16
6	Document	17
6.1	hyperref	17
6.1.1	Options	17
6.1.2	Example	17
6.1.3	Additional user macros	17

Chapter 1

Code

1.1 verbatim

1.1.1 Inline code

`\verb|<text>|` (“|” can be replaced by any character except “*”)

```
1 \verb|Hello, world!|
```

Hello, world!

1.1.2 Code block

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

```
1 \begin{verbatim}
2 def hello():
3     print("Hello, world!")
4 \end{verbatim}
```

def hello():
 print("Hello, world!")

1.1.3 Block comment

`\begin{comment} ... \end{comment}`

```
1 Text 1
2
3 \begin{comment}
4 This part will be ignored.
5 \end{comment}
6
7 Text 2
```

Text 1
Text 2

1.2 listings

`\usepackage{listings}`

1.2.1 Inline code

`\lstinline!<text>!` (“|” can be replaced by any character)

```
1 \lstinline|Hello, world!|
```

Hello, world!

1.2.2 Code block

`\begin{lstlisting} ... \end{lstlisting}`

```

1 \begin{lstlisting}
2 def hello():
3     print("Hello, world!")
4 \end{lstlisting}

```

```

def hello():
    print("Hello , world!")

```

1.2.3 Input file

`\lstinputlisting{<file-path>}`

```

1 \lstinputlisting{hello.py}

```

```

def hello():
    print("Hello , world!")

```

1.3 minted

`\usepackage{listings}`

Minted uses [Pygments](#) for syntax highlighting.

Install [Python](#) and then Pygments.

```

1 $ pip install Pygments

```

To use Pygments on L^AT_EX, you need to pass `-shell-escape` flag to L^AT_EX.

```

1 $ lualatex -shell-escape <file>

```

If you want to compile L^AT_EX document containing minted with Visual Studio Code and [LaTeX Workshop](#) Plugin, add the following to `settings.json`.

```

1 {
2     "latex-workshop.latex.tools": [
3         {
4             "name": "lualatex",
5             "command": "lualatex",
6             "args": [
7                 "-shell-escape",
8                 "-synctex=1",
9                 "-interaction=nonstopmode",
10                "-file-line-error",
11                "%DOC%"
12            ],
13            "env": {}
14        },
15        {
16            "name": "bibtex",
17            "command": "bibtex",
18            "args": [
19                "%DOCFILE%"
20            ],
21            "env": {}
22        }
23    ],
24    "latex-workshop.latex.recipes": [
25        {
26            "name": "lualatex",
27            "tools": [
28                "lualatex"
29            ]
30        },
31        {

```

```

32     "name": "lualatex -> bibtex -> lualatex * 2",
33     "tools": [
34         "lualatex",
35         "bibtex",
36         "lualatex",
37         "lualatex"
38     ]
39 }
40 ]
41 }

```

1.3.1 Inline code

`\mintinline{<language>}{<text>}`

1.3.2 Code block

For single line: `\mint{<language>}{<text>}`

```

1 \mint{python}{
2 print("Hello, world!")
3 }

```

```

1 print("Hello, world!")

```

For multiple lines: `\begin{minted} ... \end{minted}`

```

1 \begin{minted}{python}
2 def hello():
3     print("Hello, world!")
4 \end{minted}

```

```

1 def hello():
2     print("Hello, world!")

```

1.3.3 Input file

`\inputminted{<language>}{<file-path>}`

```

1 \inputminted{python}{hello.py}

```

```

1 def hello():
2     print("Hello, world!")

```

1.3.4 Captions and labels

Minted provides floating listing environment to use with caption and label.

```

1 \begin{listing}[H]
2 \mint{python}|print("Hello, world!")|
3 \caption{Code example}
4 \label{lst:example}
5 \end{listing}

```

```

1 print("Hello, world!")

```

Listing 1: Code example

1.3.5 Options

Setting global minted options

inline & code blocks

```

1 \setminted{<options>}
2 \setminted[<language>]{<options>}

```

inline

```

1 \setmintedinline{<options>}
2 \setmintedinline[<language>]{<options>}

```

Defining shortcuts

minted environment

```
1 \newminted{<language>}{<options>} % default environment-name: <language>code
2 \newminted[<environment-name>]{<language>}{<options>}
3
4 \begin{<environment-name>}
5 \end{<environment-name>}
```

mint command

```
1 \newmint{<language>}{<options>} % default macro-name: <language>
2 \newmint[<macro-name>]{<language>}{<options>}
3
4 <macro-name>/<text>/ % ``/' can be replaces by any character
```

mintinline command

```
1 \newmintinline{<language>}{<options>} % default macro-name: <language>inline
2 \newmintinline[<macro-name>]{<language>}{<options>}
3
4 <macro-name>/<text>/ % ``/' can be replaces by any character
```

inputminted command

```
1 \newmintedfile{<language>}{<options>} % default macro-name: <language>file
2 \newmintedfile[<macro-name>]{<language>}{<options>}
3
4 <macro-name>{<file-path>}
```

Available options

- autogobble (boolean): Remove gobble (leading whitespace)
- breaklines (boolean): Automatically break long lines
- frame (none | leftline | topline | bottomline | lines | single): Put lines around the code
- linenos (boolean): Linen numbers
- numbersep (dimension): Gap between numbers and start of line

```
1 \setminted{
2   autogobble,
3   breakanywhere,
4   breaklines,
5   frame=single,
6   linenos,
7   numbersep=2mm,
8 }
```

Chapter 2

Split files

2.1 input

Includes contents of the file.

```
1 \input{<subfile-path>}
```

Listing 2: main file

```
1 <file-content>
```

Listing 3: sub file

2.2 include

Includes contents of the file and automatically starts a new page. Doesn't allow nesting.

```
1 \include{<subfile-path>}
```

Listing 4: main file

```
1 <file-content>
```

Listing 5: sub file

2.3 standalone

```
1 \usepackage{standalone}  
2  
3 \input{<subfile-path>}
```

Listing 6: main file

```
1 \documentclass[preview]{standalone}
```

Listing 7: sub file

2.4 subfiles

```
1 \usepackage{subfiles}  
2  
3 \subfile{<subfile-path>}
```

Listing 8: main file

```
1 \documentclass[<mainfile-path>]{subfiles}
```

Listing 9: sub file

Chapter 3

Math

3.1 Text over and under symbols

3.1.1 Place text using overset & underset

```
1 \usepackage{amsmath} % align
2
3 \begin{align}
4   a \overset{why?}{=} b \\
5   a \underset{why?}{=} b
6 \end{align}
```

$$a \overset{why?}{=} b \quad (3.1)$$

$$a \underset{why?}{=} b \quad (3.2)$$

3.1.2 Remove extra spaces with mathclap

```
1 \usepackage{amsmath} % align
2 \usepackage{mathtools} % mathclap
3
4 \begin{align}
5   a \overset{
6     \mathclap{why?}
7   }{=} b \\
8   a \underset{
9     \mathclap{why?}
10  }{=} b
11 \end{align}
```

$$a \overset{why?}{=} b \quad (3.3)$$

$$a \underset{why?}{=} b \quad (3.4)$$

3.1.3 Multiple lines with substack

```
1 \usepackage{amsmath} % align, substack
2 \usepackage{mathtools} % mathclap
3
4 \begin{align}
5   a \overset{
```

```

6      \mathclap{
7      \substack{
8      why?    \\\
9      how?
10     }
11   }
12 }{=} b \\\
13 a \underset{
14   \mathclap{
15   \substack{
16   why?    \\\
17   how?
18   }
19 }
20 }{=} b
21 \end{align}

```

$$\begin{array}{c} \text{why?} \\ \text{how?} \\ a \stackrel{?}{=} b \end{array} \quad (3.5)$$

$$\begin{array}{c} a = b \\ \text{why?} \\ \text{how?} \end{array} \quad (3.6)$$

3.1.4 Place arrows

```

1 \usepackage{amsmath} % align, substack
2 \usepackage{mathtools} % mathclap
3
4 \begin{align}
5   a \overset{
6     \mathclap{
7       \substack{
8       why?    \\\
9       how?    \\\
10      \downarrow
11      }
12    }
13 }{=} b \\\
14 a \underset{
15   \mathclap{
16   \substack{
17   \uparrow \\\
18   why?    \\\
19   how?
20   }
21 }
22 }{=} b
23 \end{align}

```

$$\begin{array}{c} \text{why?} \\ \text{how?} \\ a \stackrel{\downarrow}{=} b \end{array} \quad (3.7)$$

$$\begin{array}{c} a = b \\ \uparrow \\ \text{why?} \\ \text{how?} \end{array} \quad (3.8)$$

3.1.5 Use long arrows with \big

```

1 \usepackage{amsmath} % align, substack
2 \usepackage{mathtools} % mathclap

```

```

3
4 \begin{align}
5   a \overset{
6     \mathclap{
7       \substack{
8         why?    \\
9         how?    \\
10        \big \downarrow
11      }
12    }
13 }{=} b \quad \\
14   a \underset{
15     \mathclap{
16       \substack{
17         \big \uparrow \\
18         why?      \\
19         how?
20       }
21     }
22 }{=} b
23 \end{align}

```

$$\begin{array}{c} \textit{why?} \\ \textit{how?} \\ \downarrow \\ a \overset{=}{=} b \end{array} \quad (3.9)$$

$$\begin{array}{c} a = b \\ \uparrow \\ \textit{why?} \\ \textit{how?} \end{array} \quad (3.10)$$

3.2 Curly braces over and under equations

```

1 \begin{align}
2   x
3   = \overbrace{a \cdot b \cdot c}^{\textit{explanation}}
4   + \underbrace{d \cdot e \cdot f}_{\textit{explanation}}
5 \end{align}

```

$$x = \overbrace{a \cdot b \cdot c}^{\textit{explanation}} + \underbrace{d \cdot e \cdot f}_{\textit{explanation}} \quad (3.11)$$

3.2.1 Inside square root or \left & \right parentheses etc.

```

1 \begin{align}
2   x
3   &= \sqrt{
4     \underbrace{a \cdot b \cdot c}_{\textit{explanation}}
5   } \\
6   y &= \left[
7     \underbrace{d \cdot e \cdot f}_{\textit{explanation}}
8     \right]
9 \end{align}

```

$$x = \sqrt{\underbrace{a \cdot b \cdot c}_{\textit{explanation}}} \quad (3.12)$$

$$y = \left[\underbrace{d \cdot e \cdot f}_{\text{explanation}} \right] \quad (3.13)$$

3.2.2 Use smash to write explanation outside

```

1 \begin{align}
2     x
3     &= \sqrt{\smash[b]{\underbrace{a \cdot b \cdot c}_{\text{explanation}}}}
4
5
6 }
7
8 y &= \left[ \smash[b]{\underbrace{d \cdot e \cdot f}_{\text{explanation}}} \right.
9
10
11
12 \left. \right]
13 \end{align}

```

$$x = \sqrt{\underbrace{a \cdot b \cdot c}_{\text{explanation}}}$$

$$y = [\underbrace{\text{explanation}}^{\text{explanation}}] \quad (3.15)$$

3.2.3 Add vertical space

```

1 \begin{align}
2   x
3   &= \sqrt{
4     \smash[b]{
5       \underbrace{a \cdot b \cdot c}_{\text{explanation}}
6     }
7   } \\
8   y &= \left[
9     \smash[b]{
10      \underbrace{d \cdot e \cdot f}_{\text{explanation}}
11    }
12    \right]
13 \end{align}

```

$$x = \sqrt{\underbrace{a \cdot b \cdot c}_{\text{explanation}}} \quad (3.16)$$

$$y = [\underbrace{d \cdot e \cdot f}_{\text{explanation}}] \quad (3.17)$$

3.3 Vector notations

- arrow: \vec{x}
- bold: **x**
- bm package: \boldsymbol{x}

3.4 Derivative notations

```
\usepackage{derivative}
```

3.4.1 Ordinary derivative

```

1 \begin{align}
2   & \frac{df}{dx} \\
3   & \odv{f}{x} \\
4   & \odv*{f}{x} \\
5 \end{align}

```

$$\frac{df}{dx} \quad (3.18)$$

$$\frac{df}{dx} \quad (3.19)$$

$$\frac{d}{dx}f \quad (3.20)$$

3.4.2 Partial derivative

```

1 \begin{align}
2   & \frac{\partial f}{\partial x} \\
3   & \pdv{f}{x} \\
4   & \pdv*{f}{x} \\
5   & \pdv{f}{!{x}} \\
6   & \pdv{f}{x,y} \\
7   & \pdv[order={2,3}]{f}{x,y,z} \\
8 \end{align}

```

$$\frac{\partial f}{\partial x} \quad (3.21)$$

$$\frac{\partial f}{\partial x} \quad (3.22)$$

$$\frac{\partial}{\partial x}f \quad (3.23)$$

$$\partial_x f \quad (3.24)$$

$$\frac{\partial^2 f}{\partial x \partial y} \quad (3.25)$$

$$\frac{\partial^6 f}{\partial x^2 \partial y^3 \partial z} \quad (3.26)$$

3.4.3 Material derivative

```

1 \begin{align}
2   & \frac{Df}{Dx} \\
3   & \mdv{f}{x} \\
4   & \mdv*{f}{x} \\
5 \end{align}

```

$$\frac{Df}{Dx} \quad (3.27)$$

$$\frac{Df}{Dx} \quad (3.28)$$

$$\frac{D}{Dx}f \quad (3.29)$$

3.4.4 Functional derivative

```

1 \begin{align}
2   & \frac{\delta f}{\delta x} \\
3   & \fdv{f}{x} \\
4   & \fdv*{f}{x} \\
5 \end{align}

```

$$\frac{\delta f}{\delta x} \quad (3.30)$$

$$\frac{\delta f}{\delta x} \quad (3.31)$$

$$\frac{\delta}{\delta x}f \quad (3.32)$$

3.4.5 Average rate of change

```

1 \begin{align}
2   & \frac{\Delta f}{\Delta x} \\
3   & \adv{f}{x} \\
4 \end{align}

```

$$\frac{\Delta f}{\Delta x} \quad (3.33)$$

$$\frac{\Delta f}{\Delta x} \quad (3.34)$$

3.4.6 Jacobian

```

1 \begin{align}
2   & \frac{\partial}{\partial} (f, g, h) \\
3   & \{ \\
4   & \partial (x, y, z) \\
5   & \} \\
6   & \} \\
7   & \jdv{f, g, h}{x, y, z} \\
8 \end{align}

```

$$\frac{\partial(f, g, h)}{\partial(x, y, z)} \quad (3.35)$$

$$\frac{\partial(f, g, h)}{\partial(x, y, z)} \quad (3.36)$$

3.5 Cancel

```
\usepackage{cancel}
```

```
1 \begin{align}
2   a
3   = \cancel{b}
4   + \bcancel{c}
5   + \xcancel{d}
6   + \cancelto{x}{e}
7 \end{align}
```

$$a = \cancel{b} + \cancel{c} + \cancel{d} + \cancel{e}^x \quad (3.37)$$

3.6 Multiline equations

```
\usepackage{amsmath}
```

```
1 \multirow{<nrows>}{<text>}
```

```
1 \begin{align}
2   \begin{split}
3     x
4     &= a \cdot b \cdot c \\
5     &+ d \cdot e \cdot f
6   \end{split}
7 \end{align}
```

$$x = a \cdot b \cdot c + d \cdot e \cdot f \quad (3.38)$$

Chapter 4

Layout

4.1 geometry

```
\usepackage{geometry}
```

```
1 \usepackage[<options>]{geometry}
```

or

```
1 \usepackage{geometry}
2
3 \geometry{<options>}
```

4.1.1 Paper size

```
1 \geometry{
2   paper=<paper-name>, % paper size
3   screen=<(W,H)>, % paper size in width & height
4   paperwidth=<length>,
5   paperheight=<length>,
6   papersize={<width>,<height>},
7   landscape,
8   portrait,
9 }
```

4.1.2 Margin size

```
1 \geometry{
2   left=<length>,
3   inner=<length>,
4   right=<length>,
5   outer=<length>,
6   top=<length>,
7   bottom=<length>,
8   hmargin=<length>, % left & right
9   vmargin=<length>, % top & bottom
10  margin=<length>, % hmargin & vmargin
11 }
```

4.1.3 Example

```
1 \geometry{
2   paper=a4paper,
```

```
3 margin=15mm,  
4 }
```

4.2 parskip

```
\usepackage[<options>]{parskip}
```

Customize indentation and margins of paragraphs.

4.2.1 Options

- skip: set \parskip
- tocskip: set \parskip within \tableofcontents
- indent: set \parindent
- parfill: set \parfillskip

4.2.2 Example

```
1 \usepackage[  
2 skip=\baselineskip,  
3 indent=0pt,  
4 ]{parskip}
```


Chapter 5

Path

5.1 currfile

```
\usepackage{currfile}
```

Currfile provides path information for the current file.

```
1 \currfiledir % directory with slash
2 \currfilebase % name without extension
3 \currfileext % extension without dot
4 \currfilename % base + "." + extension
5 \currfilepath % directory + name
```

Chapter 6

Document

6.1 hyperref

```
\usepackage{hyperref}
```

6.1.1 Options

```
1 \hypersetup{<options>}
```

- colorlinks (false): colors the text of links and anchors
- linkcolor (red): normal internal links
- anchorcolor (black): anchor text
- citecolor (green): bibliographical citations
- filecolor (cyan): local files
- menucolor (red): acrobat menu items
- runcolor (filecolor): run links (launch annotations)
- urlcolor (magenta): URLs
- allcolors

6.1.2 Example

```
1 \hypersetup{  
2   colorlinks  
3 }
```

6.1.3 Additional user macros

```
1 \href{URL}{text}  
2 \url{URL}  
3 \hyperref{URL}{category}{name}{text} % URL#category.name
```