

L^AT_EX Experiments

AeAeA

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1 TeX distributions

1.1 MacTeX

The best for Mac.

```
$ brew cask install mactex
```

1.2 Visual Studio Code LaTeX Workshop Extension

LaTeX Workshop is an extension for Visual Studio Code, aiming to provide core features for LaTeX typesetting with Visual Studio Code.

- <https://github.com/James-Yu/LaTeX-Workshop>
- <https://github.com/James-Yu/LaTeX-Workshop/wiki/Compile>

Build LaTeX file by calling the command **Build LaTeX project** from the Command Palette or from the TeX badge. This command is bound to **Cmd+Ctrl+b**

You can change VS Code settings by opening Settings tab:

Cmd+, -> Extensions -> LaTeX

or, alternatively, by directly editing settings.json file:

`~/Library/Application\ Support/Code/User/settings.json`

Recommended settings for LaTeX Workshop:

```
{
  "latex-workshop.view.pdf.viewer": "tab",
  "latex-workshop.latex.outDir": "%DIR%/texout",
  "latex-workshop.latex.autoBuild.run": "never",
  "latex-workshop.latex.autoClean.run": "onBuilt"
}
```

1.3 MiKTeX

Not for Mac. Old MiKTeX installation:

`/usr/local/bin/`

`/Applications/MiKTeX\ Console.app/`

1.4 TinyTeX

TinyTeX - a lightweight, cross-platform, portable, and easy-to-maintain L^AT_EX distribution based on TeX Live.

Currently TinyTeX works best for R users. Installing and maintaining TinyTeX is easy for R users, since the R package tinytex has provided wrapper functions.

For other (non-R) users:

- TinyTeX docs: <https://yihui.org/tinytex/>
- In the directory
~/Library/TinyTeX/texmf-dist/tex/latex/
you can find all L^AT_EX packages installed for TinyTeX.
- If you compile a LaTeX document and run into an error message like this:
! LaTeX Error: File 'times.sty' not found.
It basically indicates a missing LaTeX package.
Use the command `tlmgr search` to find the name of the missing package:

```
$ tlmgr search --global --file "/times.sty"
psnfss: texmf-dist/tex/latex/psnfss/times.sty
```


In this case, the missing package is `psnfss`, and we can install a package via `tlmgr install`, e.g.,

```
$ tlmgr install psnfss
```


If you still see error messages that you don't understand, you may need to update everything:

```
$ tlmgr update --self --all
$ tlmgr path add
$ fmtutil-sys --all
```
- To uninstall TinyTeX use command line:

```
$ tlmgr path remove
$ rm -r "~/Library/TinyTeX"
```

2 Epigraph

In doing what we ought we deserve no praise, because it is our duty.

— Saint Augustine

2.1 Online docs

- <https://en.wikibooks.org/wiki/LaTeX> L^AT_EXwiki (very informative).
- <http://texdoc.net/> TeXdoc is a T_EX and L^AT_EX documentation lookup system.

2.2 Using colours

This example shows different examples on how to use the `xcolor` package to change the colour of elements in L^AT_EX.

- blue
- cyan
- ForestGreen
- RubineRed

Change the text color to `red`, or the background color to `BurntOrange`.

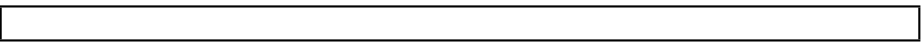
2.3 Units and page layout

- https://en.wikibooks.org/wiki/LaTeX/Page_Layout

Standard L^AT_EX units: mm, cm, pt, in, with $1\text{in} = 72.27\text{pt}$ and $1\text{pt} = 0.3515\text{mm}$ and $1\text{mm} = 2.8445\text{pt}$.

US Letter (letterpaper) is 8.5 x 11 in, 215.9 x 279.4 mm, 614.295 x 794.97 pt, aspect ratio 1.294.

A4 (a4paper) is 8.3 x 11.7 in, 210 x 297 mm, 597.44 x 844.95 pt, aspect ratio 1.414 ($\approx \sqrt{2}$).



The current page layout picture below is generated by calling command `\layout*` from `\usepackage{layout}`.¹

1	one inch + <code>\hoffset</code>	2	one inch + <code>\voffset</code>
3	<code>\oddsidemargin = 62pt</code>	4	<code>\topmargin = 16pt</code>
5	<code>\headheight = 12pt</code>	6	<code>\headsep = 25pt</code>
7	<code>\textheight = 550pt</code>	8	<code>\textwidth = 345pt</code>
9	<code>\marginparsep = 11pt</code>	10	<code>\marginparwidth = 65pt</code>
11	<code>\footskip = 30pt</code>		<code>\marginparpush = 5pt (not shown)</code>
	<code>\hoffset = 0pt</code>		<code>\voffset = 0pt</code>
	<code>\paperwidth = 614pt</code>		<code>\paperheight = 794pt</code>

¹An example footnote.

Margin note
1in=72.27pt
1pt=0.35mm
1mm=2.84pt

textwidth
345pt = 4.77in
= 121.48mm

textheight
550pt = 7.61in
= 193.66mm

3 verbatim and listings

3.1 verbatim

Text enclosed inside

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

environment is printed directly
and all `\LaTeX{}` commands are ignored.

Text enclosed inside `\begin{verbatim*}` environment
is printed directly
and all `\LaTeX{}` commands are ignored,
and white spaces are emphasized with a special symbol.

Use `\verb+<inline verbatim text>+` like this:

The `\ldots` command produces ...

3.2 listings: Source code printing

- listings package documentation
- https://www.overleaf.com/learn/latex/Code_listing

3.2.1 minimal setup

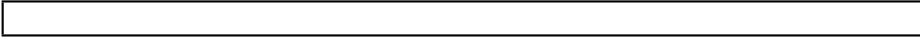
Example of using the `\begin{lstlisting}[language=Python]` environment
from the `\usepackage{listings}` package to highlight Python code:

```
import numpy as np

def incmatrix(genl1, genl2):
    m = len(genl1)
    n = len(genl2)
    M = None #to become the incidence matrix
    VT = np.zeros((n*m, 1), int) #dummy variable

    #compute the bitwise xor matrix
    M1 = bitxormatrix(genl1)
    M2 = np.triu(bitxormatrix(genl2), 1)

    for i in range(m-1):
        for j in range(i+1, m):
            [r, c] = np.where(M2 == M1[i, j])
            for k in range(len(r)):
                VT[(i)*n + r[k]] = 1;
                VT[(i)*n + c[k]] = 1;
                VT[(j)*n + r[k]] = 1;
                VT[(j)*n + c[k]] = 1;
```



```
        if M is None:
            M = np.copy(VT)
        else:
            M = np.concatenate((M, VT), 1)

    VT = np.zeros((n*m,1), int)

    return M
```

3.2.2 with code styles and colours

You need `\usepackage{xcolor}` package for the code colouring.

Just like in floats (tables and figures), captions can be added to a listing for a more clear presentation. This caption can be later used in the list of Listings `\lstlistoflistings`.

```
1 import numpy as np
2
3 def incmatrix(genl1,genl2):
4     m = len(genl1)
5     n = len(genl2)
6     M = None #to become the incidence matrix
7     VT = np.zeros((n*m,1), int) #dummy variable
8
9     s = "codepurple"
10
11     #compute the bitwise xor matrix
12     M1 = bitxormatrix(genl1)
13     M2 = np.triu(bitxormatrix(genl2),1)
14
15     for i in range(m-1):
16         for j in range(i+1, m):
17             [r,c] = np.where(M2 == M1[i,j])
18             for k in range(len(r)):
19                 VT[(i)*n + r[k]] = 1;
20                 VT[(i)*n + c[k]] = 1;
21                 VT[(j)*n + r[k]] = 1;
22                 VT[(j)*n + c[k]] = 1;
23
24             if M is None:
25                 M = np.copy(VT)
26             else:
27                 M = np.concatenate((M, VT), 1)
28
29             VT = np.zeros((n*m,1), int)
30
31     return M
```

Listing 1: Python example

4 Inserting Images

L^AT_EX can not manage images by itself, so we need to use the `graphicx` package. To use it, we include the following line in the preamble: `\usepackage{graphicx}`

The command `\graphicspath{ {./images/} }` tells L^AT_EX that the images are kept in a folder named `images` under the directory of the main document.

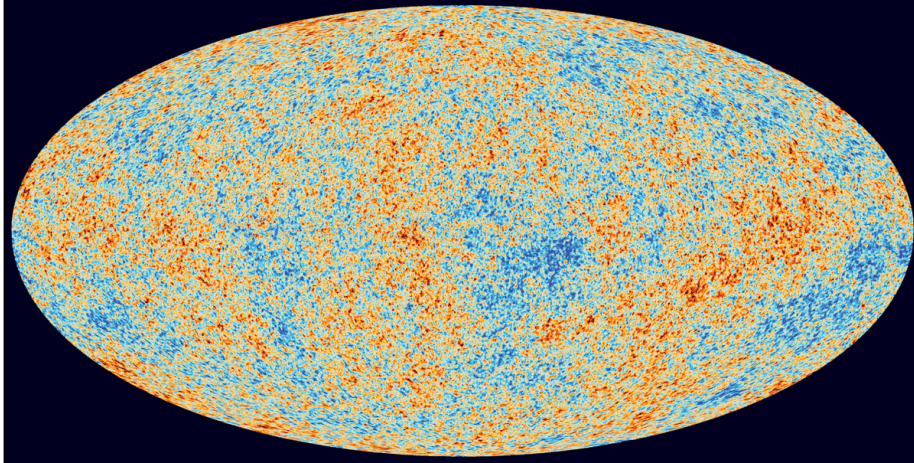


Figure 1: Cosmic Microwave Background, by Planck Space Telescope

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