Linear Algebra
Google Colab Tutorial

TA : b08201054 鄭承櫸, b08901172 莊鳴鐸

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Introduction

Colaboratory, or "Colab" for short, allows you to write and execute Python in your browser, with

- Zero configuration required
- Easy sharing

  → The main reasons to use Colab in this course.

- Free access to GPUs

  → You will find it useful if you learn machine learning in the future.

- Maintained by Google → handy Google APIs

Introduction

In this demo, your will learn the following :

- Basics about Colab (how to use it)
- Connect google colab with your google drive

Modified from the ML 2021 version:

https://speech.ee.ntu.edu.tw/~hylee/ml/ml2021-course-data/hw/Colab/Google_Colab_Tutorial.pdf

You can learn more about Colab from it.

Languages in Colab

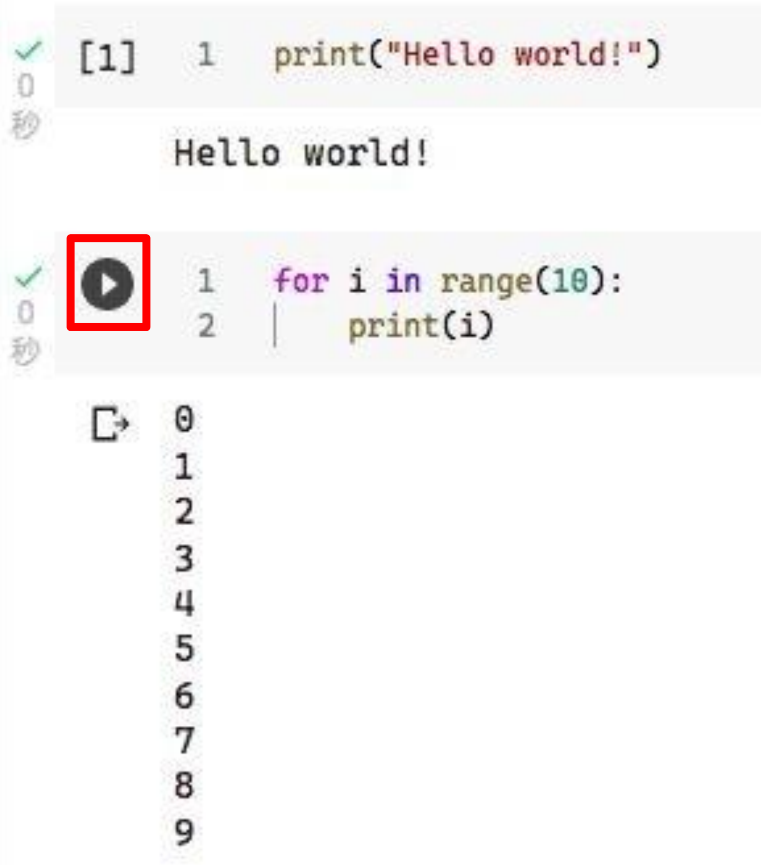
(IPython → Jupyter Notebook → Google Colab)

3 main programming languages involved in Google Colaboratory.

- Python → The **main** language (We assume you've learnt it.)
- Shell script → a script language used to control the computer a.k.a. the command line. The *bash* and *zsh* are the most common ones.
- Markdown → a *markup* language, formatting the text (and more!)

Python - Executing Code Blocks

- Simply type your Python code into a **cell**, and press Shift(command) + Enter or click on the play button to execute it.



```python
print("Hello world!")
```

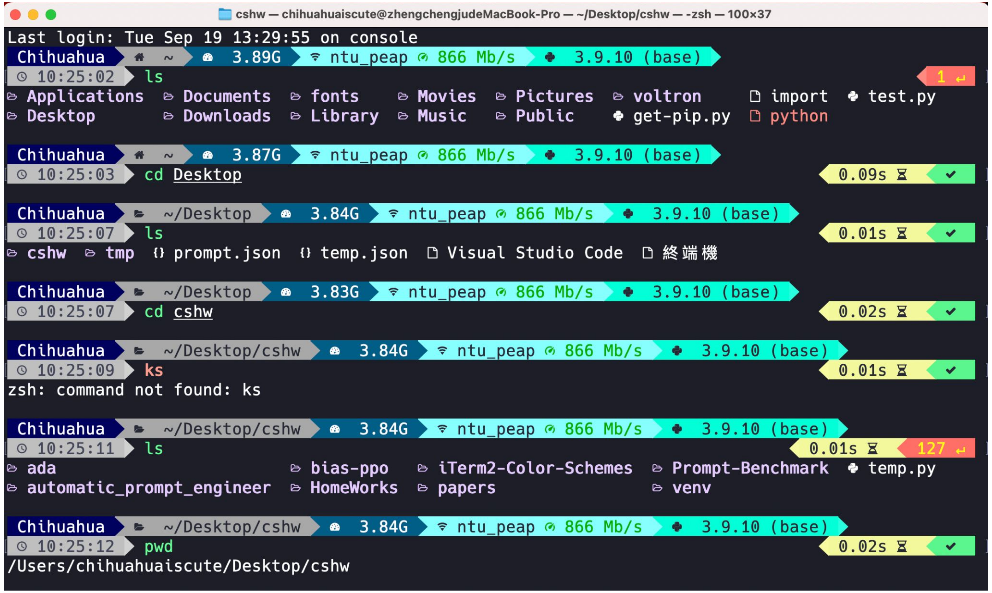
```
Hello world!
```

```python
for i in range(10):
    print(i)
```

```
0
1
2
3
4
5
6
7
8
9
```

Shell Script

- Command Line/Terminal
  - Used in MacOS or Linux.



cshw — chihuahuaiscute@zhengchengjudeMacBook-Pro — ~/Desktop/cshw — -zsh — 100×37

```
Last login: Tue Sep 19 13:29:55 on console
 Chihuahua   ~   3.89G   ntu_peap  866 Mb/s   3.9.10 (base)
 10:25:02  ls                                                             1 ↵
 Applications   Documents   fonts     Movies   Pictures   voltron      import   test.py
 Desktop        Downloads   Library   Music    Public     get-pip.py   python

 Chihuahua   ~   3.87G   ntu_peap  866 Mb/s   3.9.10 (base)
 10:25:03  cd Desktop                                                 0.09s   ✓

 Chihuahua   ~/Desktop   3.84G   ntu_peap  866 Mb/s   3.9.10 (base)
 10:25:07  ls                                                         0.01s   ✓
 cshw   tmp   prompt.json   temp.json   Visual Studio Code   終端機

 Chihuahua   ~/Desktop   3.83G   ntu_peap  866 Mb/s   3.9.10 (base)
 10:25:07  cd cshw                                                    0.02s   ✓

 Chihuahua   ~/Desktop/cshw   3.84G   ntu_peap  866 Mb/s   3.9.10 (base)
 10:25:09  ks                                                         0.01s   ✓
zsh: command not found: ks

 Chihuahua   ~/Desktop/cshw   3.84G   ntu_peap  866 Mb/s   3.9.10 (base)
 10:25:11  ls                                                    0.01s   127 ↵
 ada                              bias-ppo   iTerm2-Color-Schemes   Prompt-Benchmark   temp.py
 automatic_prompt_engineer        HomeWorks  papers                 venv

 Chihuahua   ~/Desktop/cshw   3.84G   ntu_peap  866 Mb/s   3.9.10 (base)
 10:25:12  pwd                                                        0.02s   ✓
/Users/chihuahuaiscute/Desktop/cshw
```

Common Shell Commands

ls : List all files in the current directory (“-l” for details)

pwd : Output the working directory
cd [dir] : Move into the directory named [dir] (default to the home directory) mv

oldpath newpath : Rename or move files from oldpath to newpath

cp filename dir : Copy a file named filename into a directory named dir

echo [sometext] : display “sometext” == print in Python

cat <filename> : display the contents of filename

Common Shell Commands

touch <filename> : Create a file named <filename>

mkdir <dirname> : Create a directory named <dirname>

rm <filename> : Remove a file named <filename> (“-r” for recursively)

Be careful when using this!

rmdir <dirname> : Remove an **empty** directory named <dirname>

wget : Download files from the internet

python <python_file> : Executes a python file

Shell Script in Colab

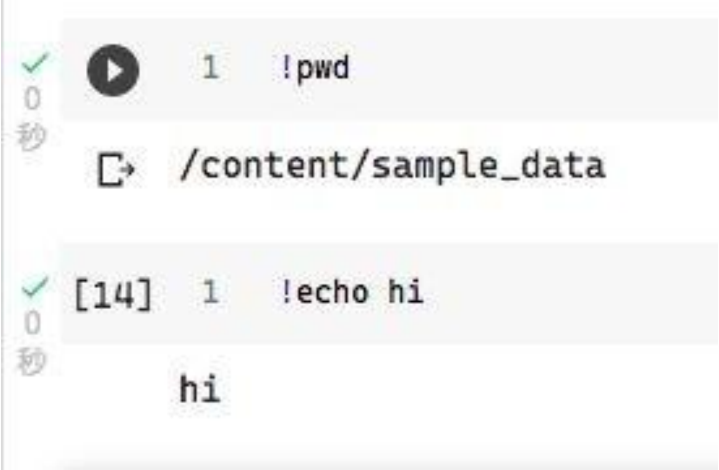
You can use most shell script commands by prepending an exclamation mark “!”

e.g.

```
!echo

!pwd

!cp p1.py myfolder
```



```
!pwd
```

```
/content/sample_data
```

```
!echo hi
```

```
hi
```

Shell Script in Colab - Advanced (Optional)

IPython magics -- Some special commands defined in the IPython language by prepending one “%” (line) or two percentage marks “%%” (cell).

e.g.

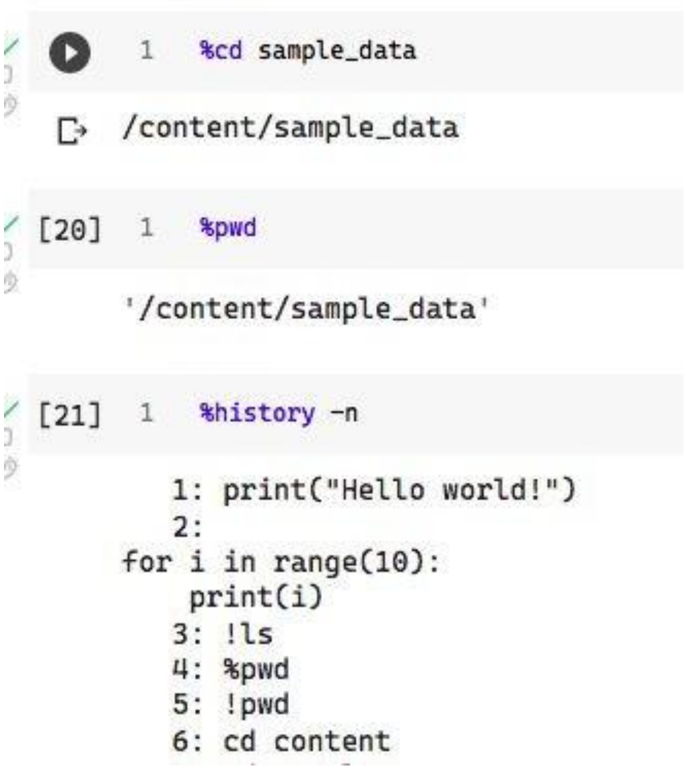
```
%cd sample_data

%pwd

%history -n

%%bash

%%time
```



```
%cd sample_data
```

```
/content/sample_data
```

```
[20] %pwd
```

```
'/content/sample_data'
```

```
[21] %history -n
```

```
   1: print("Hello world!")
   2:
for i in range(10):
    print(i)
   3: !ls
   4: %pwd
   5: !pwd
   6: cd content
```

Shell Script in Colab - Note

Syntax conflicts(?) between shell and IPython magic:

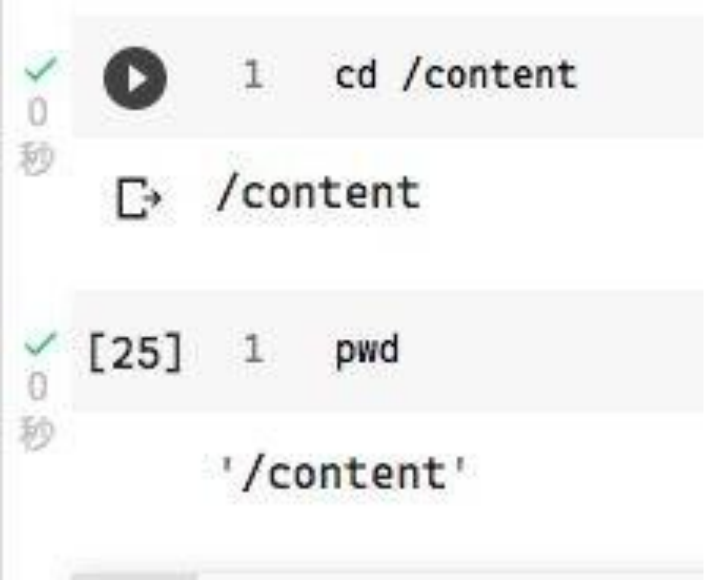
Don’t prepend “!” when using

`cd`

and

`pwd`

Colab will works normally if you don’t.



```
cd /content
```

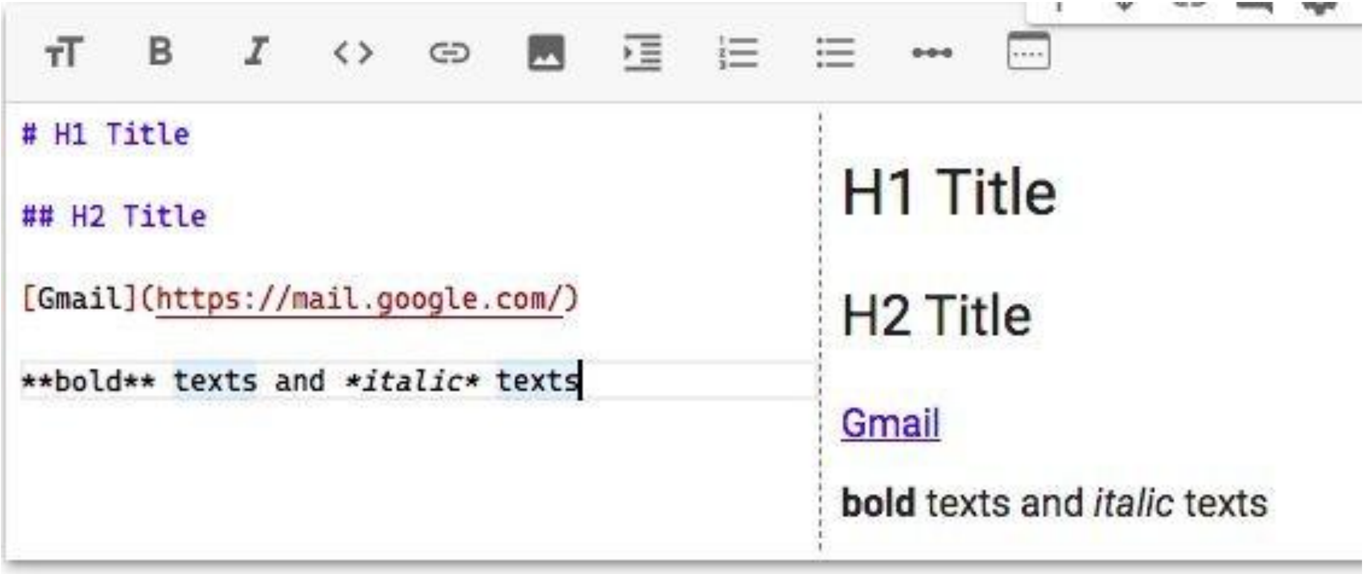
```
/content
```

```
pwd
```

```
'/content'
```

Markdown - A Brief Introduction

A markup language that can be transformed into HTML in an intuitively syntax.



```
# H1 Title

## H2 Title

[Gmail](https://mail.google.com/)

**bold** texts and *italic* texts
```

H1 Title

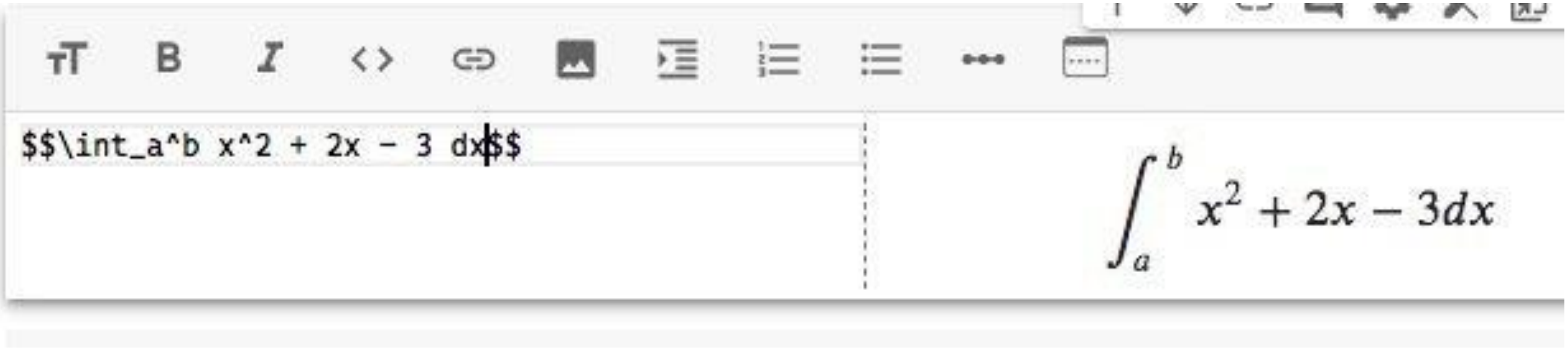
H2 Title

Gmail

bold texts and *italic* texts

Markdown - A Brief Introduction

LaTex formula supported!



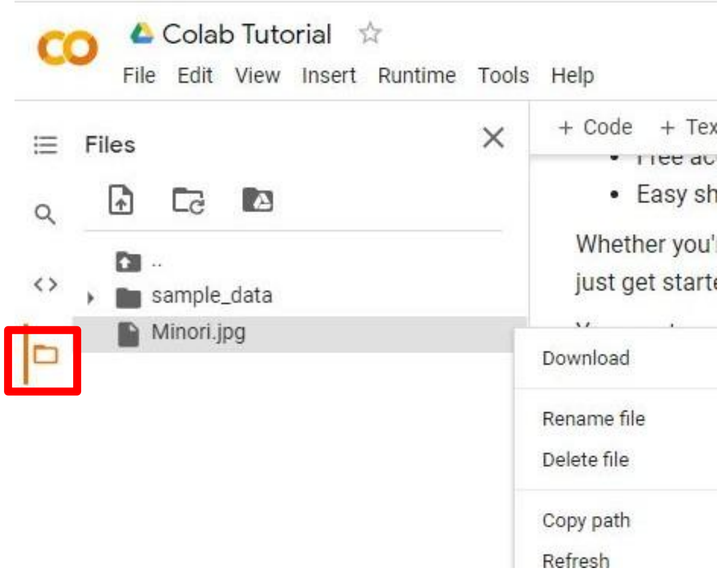
```
$$\int_a^b x^2 + 2x - 3 dx$$
```

$$\int_a^b x^2 + 2x - 3dx$$

File Structure

Clicking on the folder icon will give you the visualization of the file structure

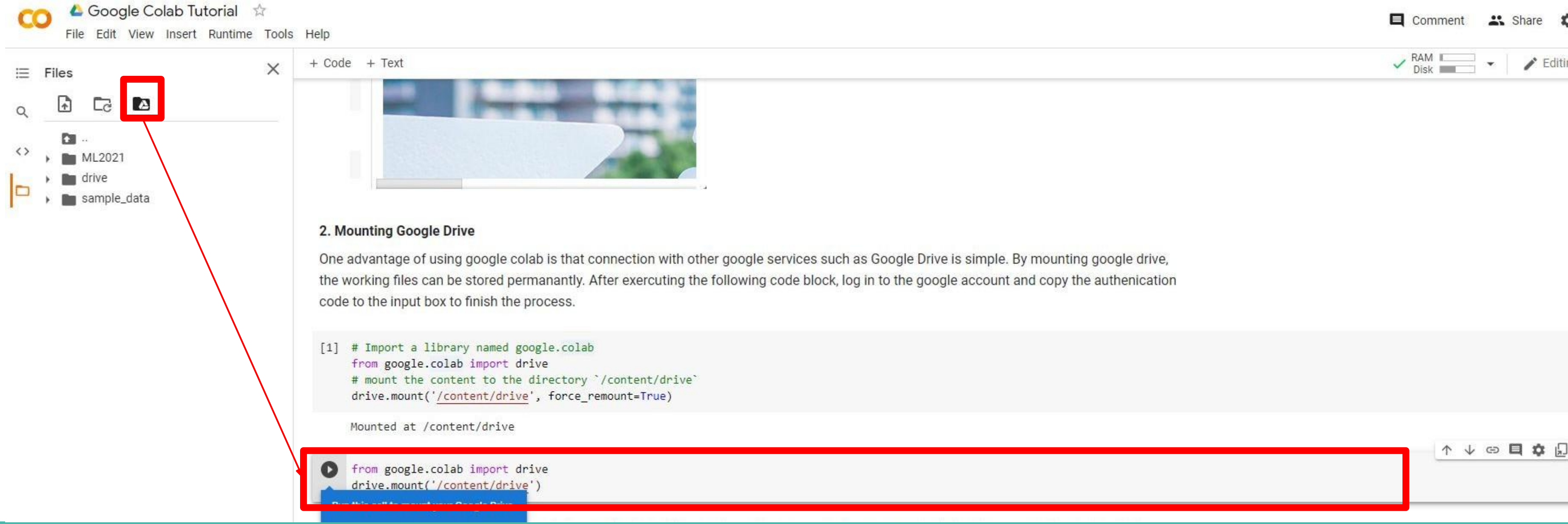
The file is temporarily stored, and will be removed once you end your session. You can download the file to your local directory.



Mounting Google Drive

Execute the code block with `drive.mount('/content/drive')`

or click on the Google Drive icon, a code block will appear



2. Mounting Google Drive

One advantage of using google colab is that connection with other google services such as Google Drive is simple. By mounting google drive, the working files can be stored permanantly. After exercuting the following code block, log in to the google account and copy the authenication code to the input box to finish the process.

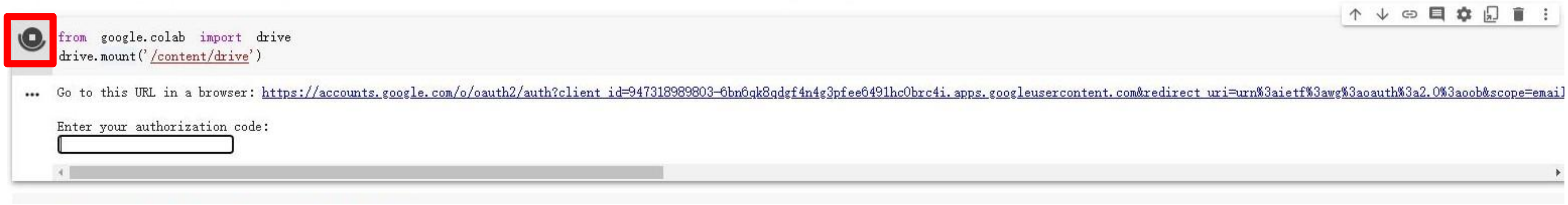
```
[1] # Import a library named google.colab
    from google.colab import drive
    # mount the content to the directory `/content/drive`
    drive.mount('/content/drive', force_remount=True)
```

```
Mounted at /content/drive
```

```
from google.colab import drive
drive.mount('/content/drive')
```

Mounting Google Drive

Sign in to your google account to get the authorization code. Enter the authorization code in the box below.



```
from google.colab import drive
drive.mount('/content/drive')
```

```
Go to this URL in a browser: https://accounts.google.com/o/oauth2/auth?client_id=947318989803-6bn6qk8qdgf4n4g3pfee6491hc0brc4i.apps.googleusercontent.com&redirect_uri=urn%3aietf%3awg%3aoauth%3a2.0%3aoob&scope=email

Enter your authorization code:
```

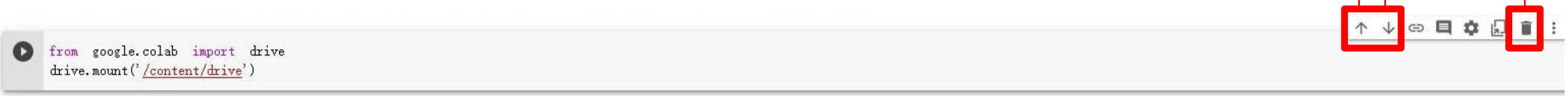
Moving and Creating a New Code Block

You can create a new code block by clicking on +Code(程式碼) on the top

Move cell up

Move cell down

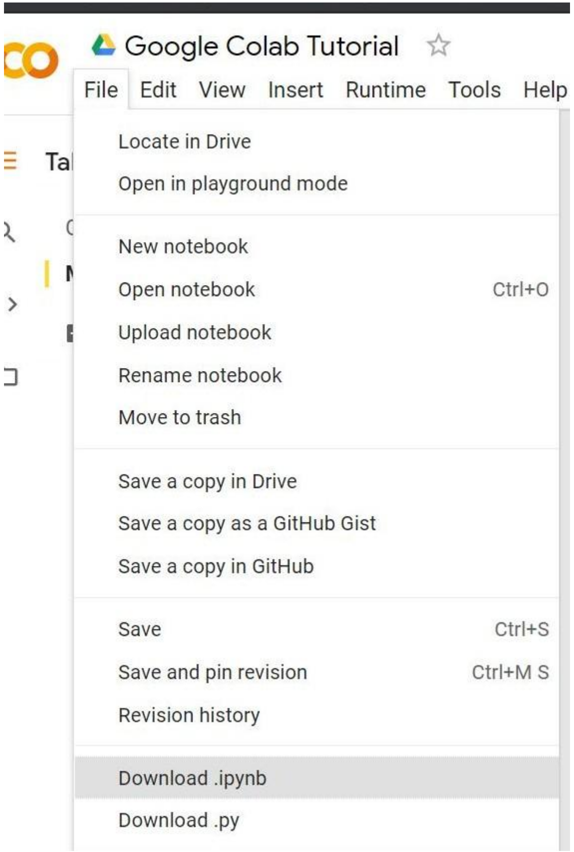
Delete cell



```
from google.colab import drive
drive.mount('/content/drive')
```

Saving Colab

You can download the ipynb file to your local device (File > Download .ipynb), or save the colab notebook to your google drive (File > Save a copy in Drive).



Q & A