



Python - Introduction

Python (基礎班)

Department of Engineering

IVE(Lee Wai Lee)

香港專業教育學院（李惠利）工程系

https://www.ive.edu.hk/lwl/ivesite/html/tc/campus_lwl_campusoffices_emt_overview.html

Revised: April 2025

Learning Outcomes 學習內容

After completion of the 2-hour taster programme, students should be able to:

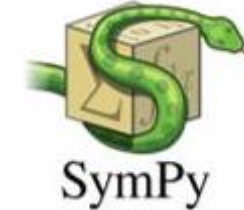
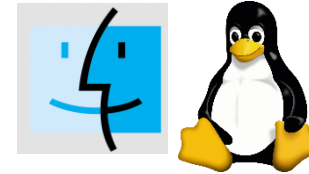
- Install Python and IDE on PC and use them to write codes
- Understand the Python basics (e.g. syntax, comments, variables, data types, numbers, Booleans, strings, lists, , standard libraries, Function)
- Understand simple conditionals (e.g. if statement, for and while loops)
- write a Python code to solve simple math problem

完成 2 小時的體驗課程後，學生應能：

- 在PC上安裝Python和IDE，並嘗試編寫程式碼
- Python 基礎知識 (e.g. 變數與資料類型, 函數, 標準函式庫)
- 選擇 (e.g. if statement, for and while 迴圈)
- 課堂作業 - 編寫 Python 程式碼來解決簡單的數學問題

Why Python?

- Easy to use
- Active community
- Compatible with many platforms
- Excellent ranges of libraries, packages
- Data science
- Machine learning
- Web development
- Career opportunities



Just want to try Python without installing anything?

- Go to <https://jupyter.org/>

File → New → Notebook

The diagram illustrates the workflow for trying Jupyter without installation:

- Jupyter Website:** The top left shows the Jupyter homepage with the logo and tagline: "Free software, open standards, and web services for interactive computing across all programming languages".
- Try on browser:** A red arrow points to the "Try it in your browser" button on the JupyterLab interface preview.
- Jupyter Notebook Interface:** A central box shows the Jupyter Notebook logo and the text: "The original web application for creating and sharing computational documents".
- File Menu:** A screenshot of the JupyterLab interface shows the "File" menu open, with "New" selected, and "Notebook" highlighted in the submenu. A red arrow points to the "Notebook" option.
- Code Cell:** The bottom right shows a code cell in a notebook with the following code:

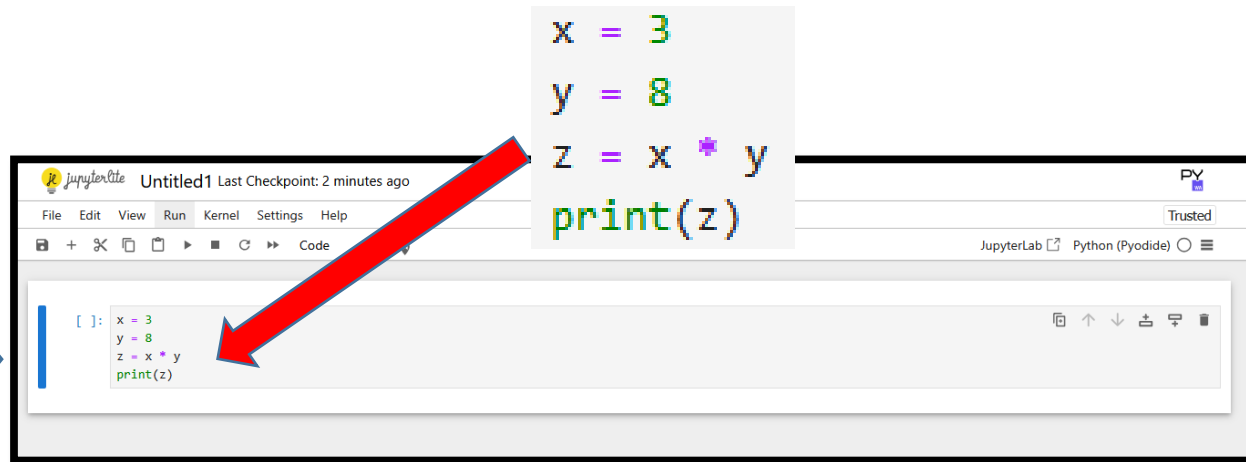
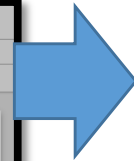
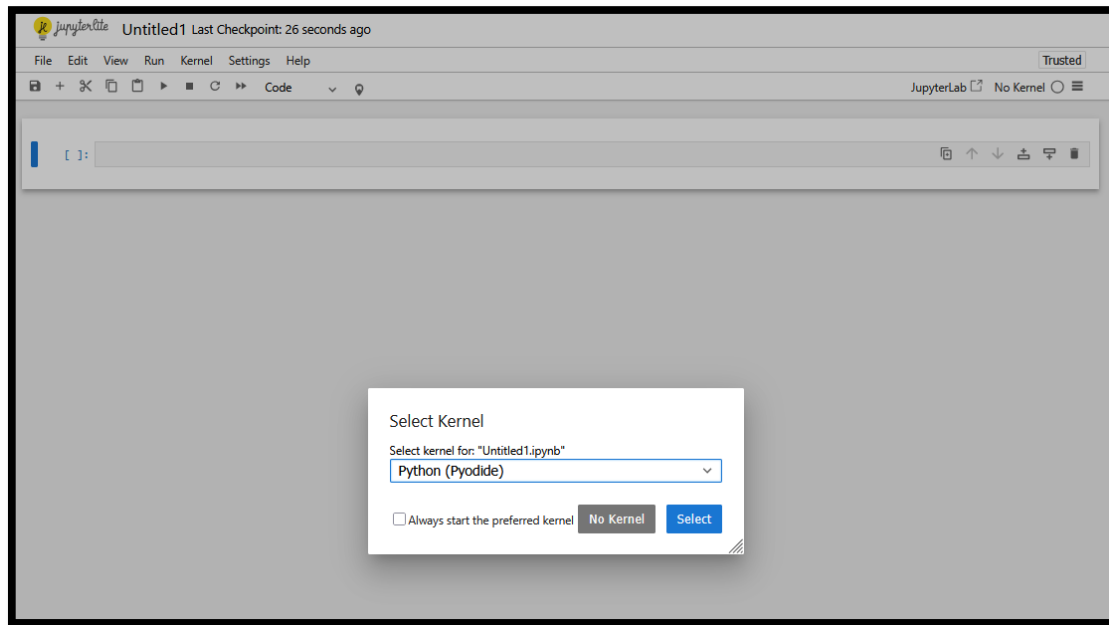
```
[1]: from matplotlib import pyplot as plt
import numpy as np

# Generate 100 random data points along 3 dimensions
```

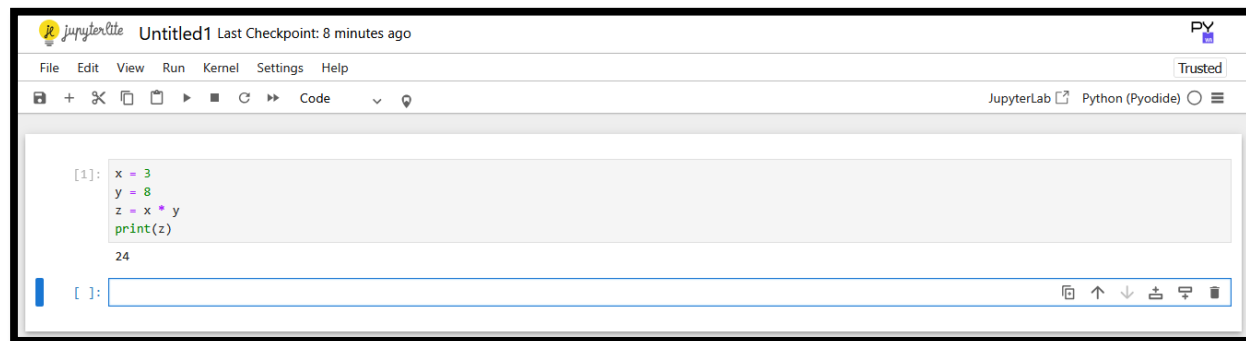
Try on browser

Using Jupyter Notebook online (no download)

- Select the right kernel



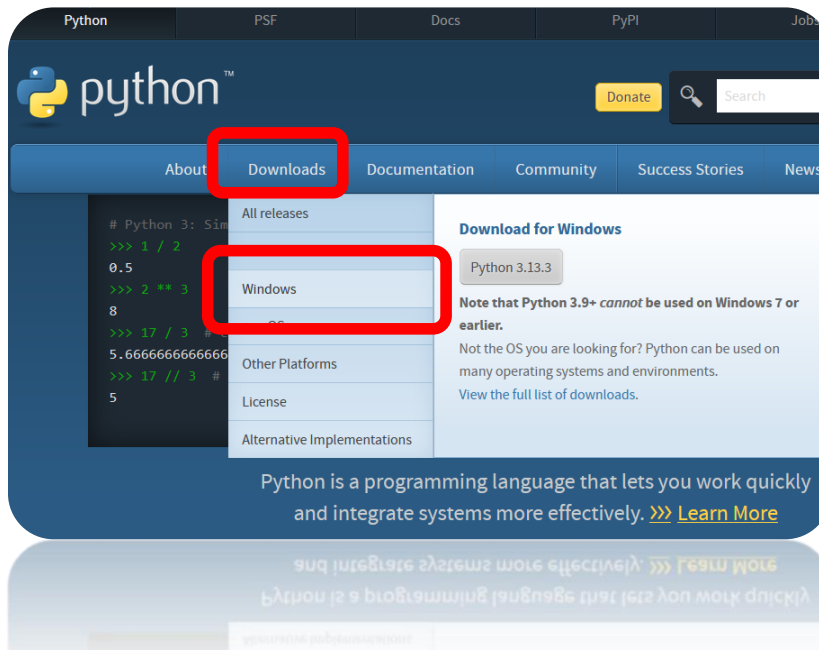
Run the selected cell by pressing
“Shift” + “Enter” or ►



Python on your PC | 安裝 Python

- <https://www.python.org/>

1. Downloads → Windows



2. Scroll down and find Python 3.12.10, download the installer for Windows (64-bit)

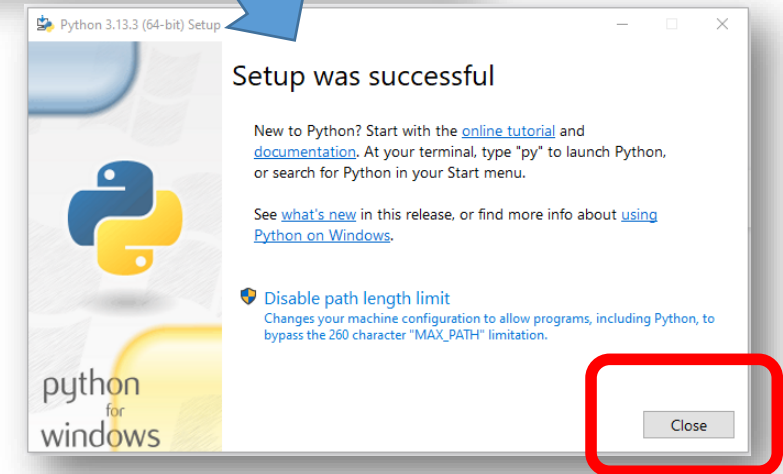
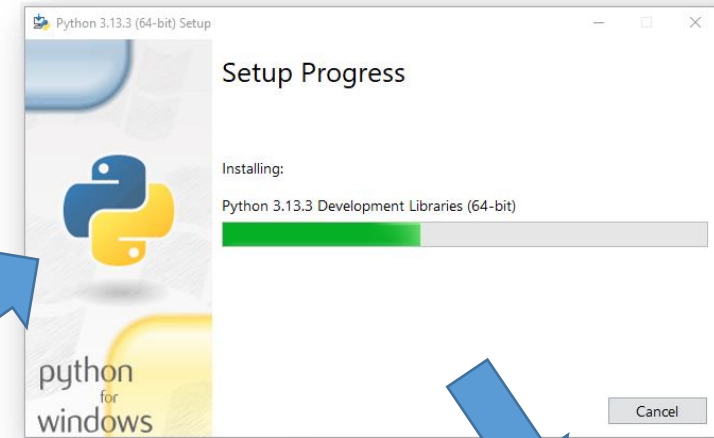
- Download [Windows embeddable package \(ARM64\)](#)
- [Python 3.12.10 - April 8, 2025](#)
Note that Python 3.12.10 *cannot* be used on Windows 7 or earlier.
 - Download [Windows installer \(64-bit\)](#)
 - Download [Windows installer \(32-bit\)](#)
 - Download [Windows installer \(ARM64\)](#)
 - Download [Windows embeddable package \(64-bit\)](#)
 - Download [Windows embeddable package \(32-bit\)](#)
 - Download [Windows embeddable package \(ARM64\)](#)
- [Python 3.10.17 - April 8, 2025](#)
Note that Python 3.10.17 *cannot* be used on Windows 7 or earlier.

3. From your Download folder, double click the application file (**python-3.12.10-amd64.exe**) that you just downloaded

Install Python 3.12.10 (64-bit)

Python 最新的版本是 3.13.3，但有些 Framework (如 TensorFlow) 暫時未支援此版本，所以本課程是使用 3.12.10 版本。

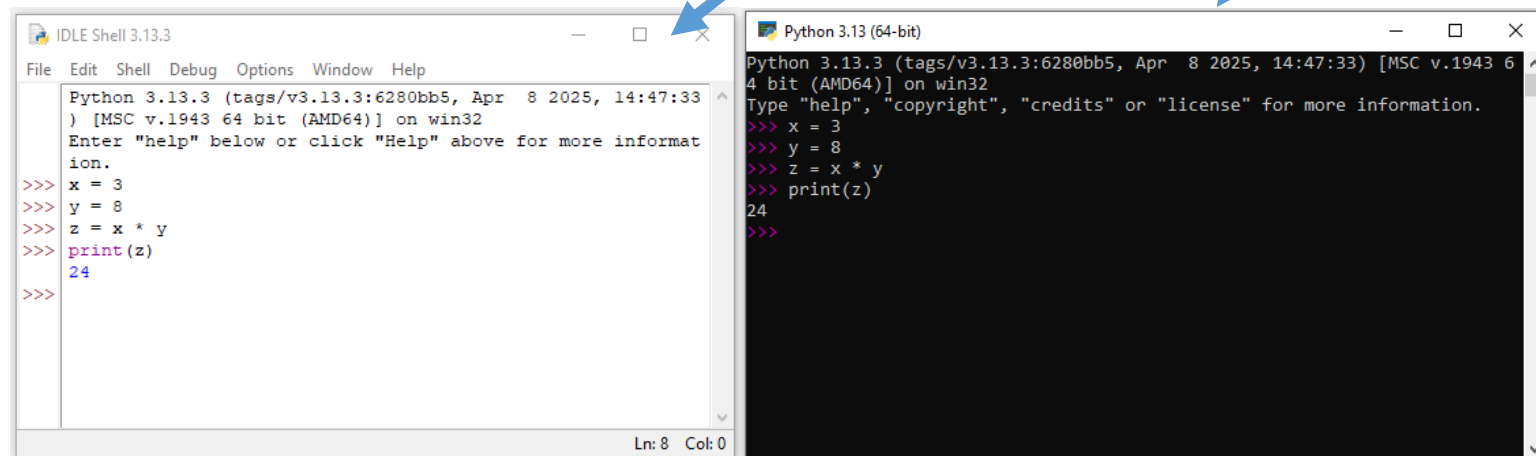
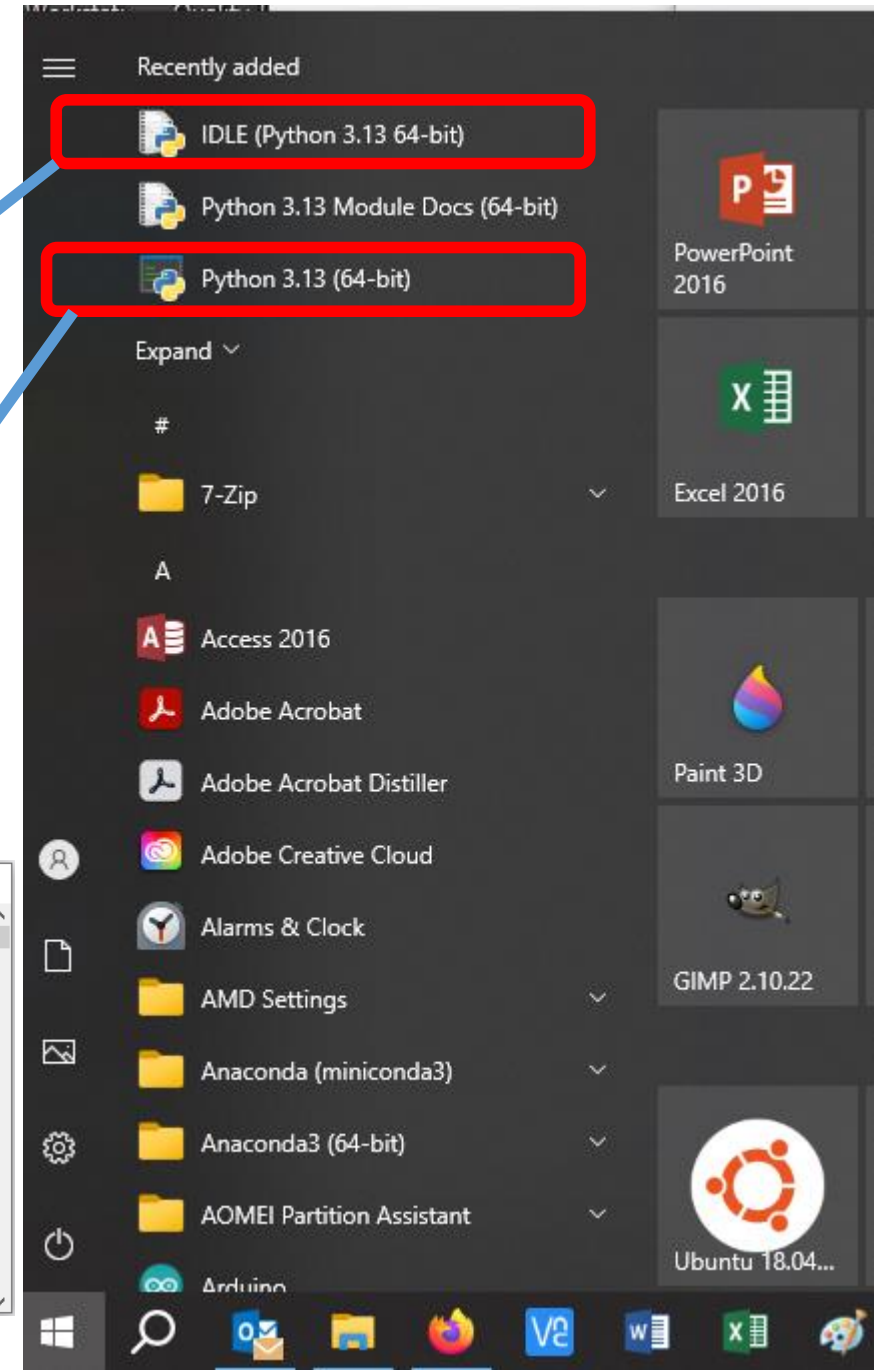
- Make sure “Add python.exe to PATH” is checked ☒
- Then, click “Install Now”



Python installed

For Windows 10

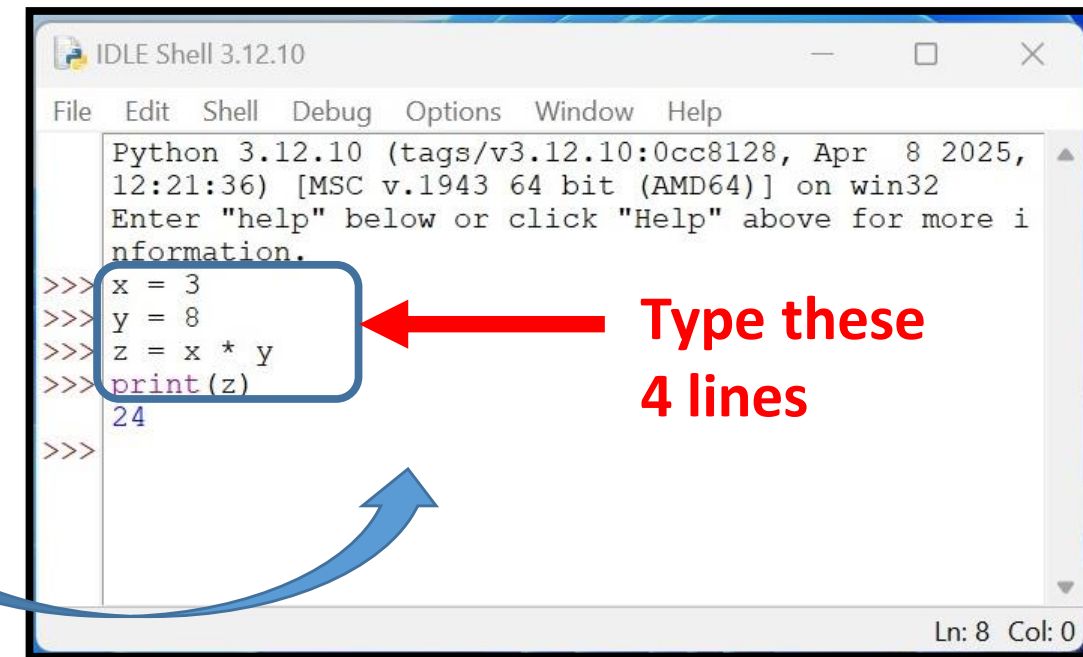
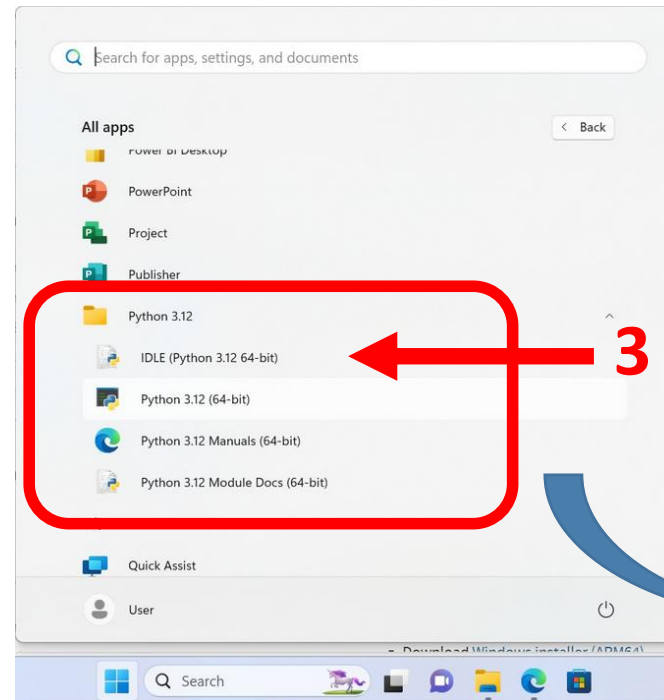
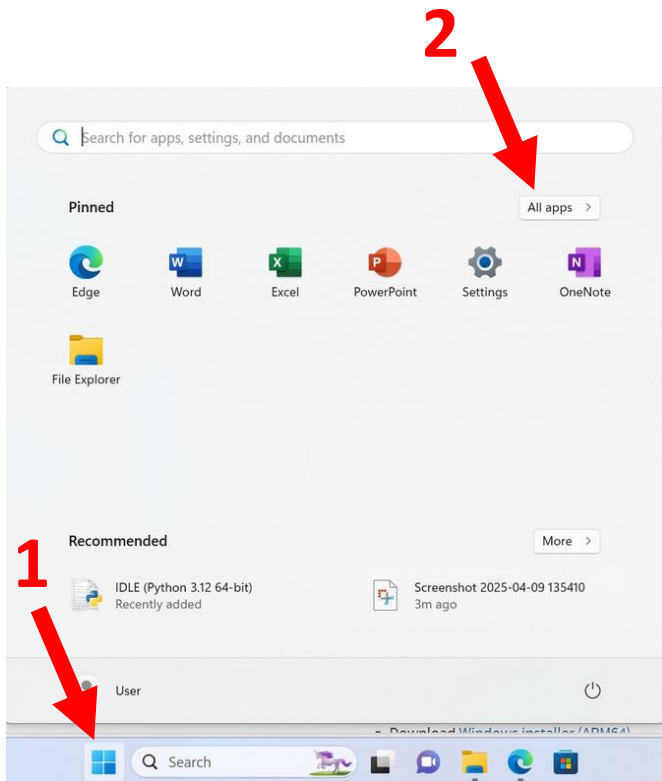
- Try the **IDLE** and Python Shell that are installed together
- **IDLE** is Python's Integrated Development and Learning Environment
- Python Shell window



Run Python

For Windows 11

- Run the Python IDLE Shell after Python is installed

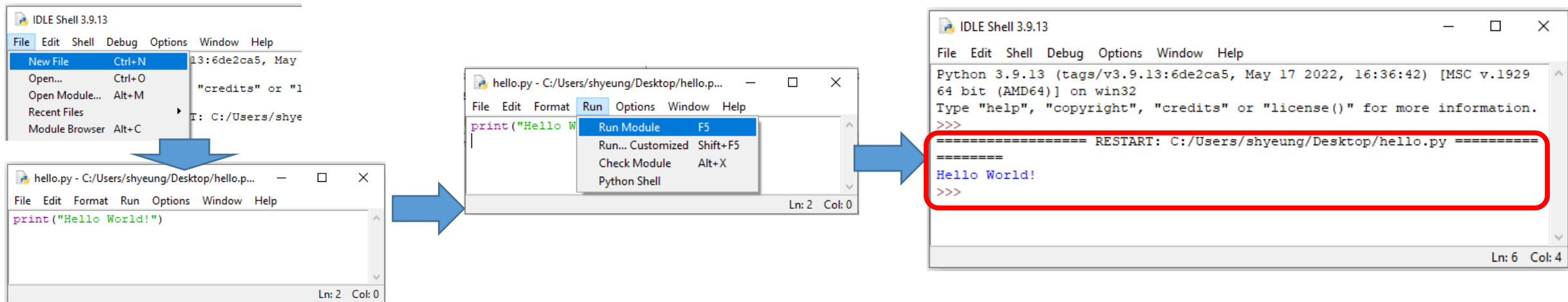


Further use of Python IDLE

- 在IDLE 程式，選取 “File” => “New File”
- 鍵入以下程式：

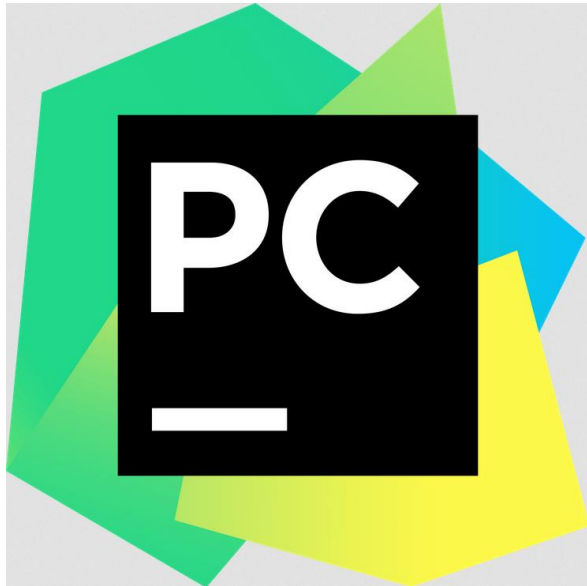
```
print ("Hello World")
```

- 將程式儲存為 “hello.py”。選取 “Run” => “Run Module” 或按 F5 鍵去運行程式。



Some good IDE (Integrated Development Environment)

- There are several popular Python IDEs that you can use for free



PyCharm

<https://www.jetbrains.com/pycharm/>



VS Code

<https://code.visualstudio.com/>



Sublime Text

<https://www.sublimetext.com/>



Atom

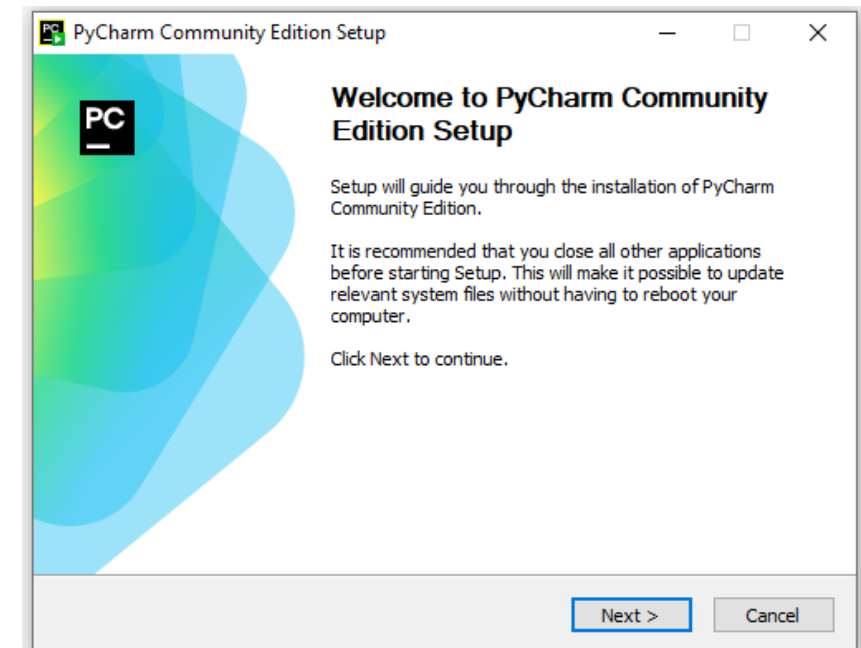
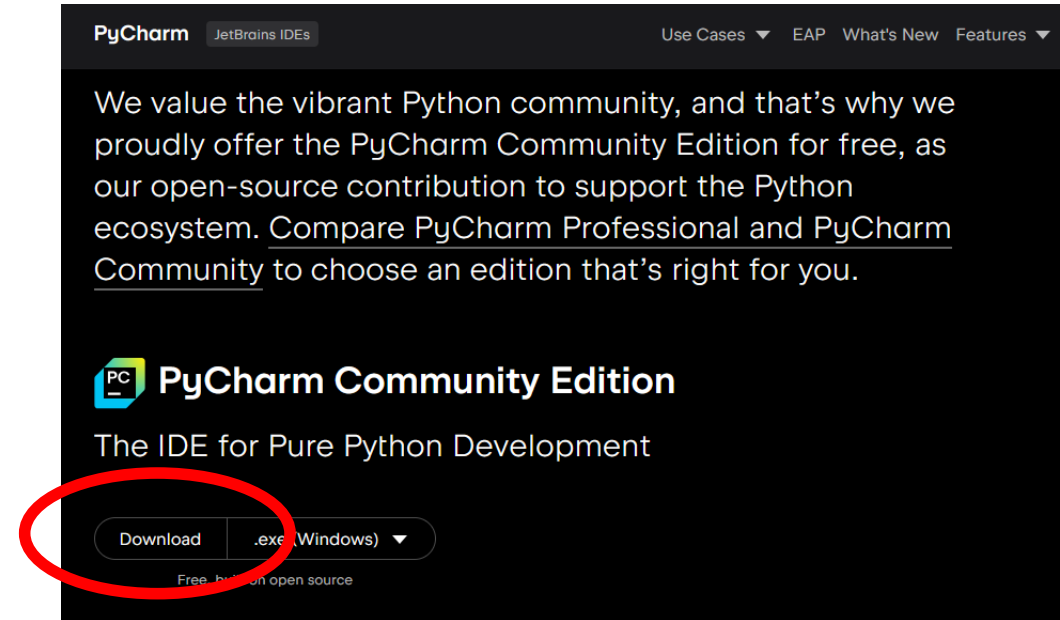
<https://atom-editor.cc/>



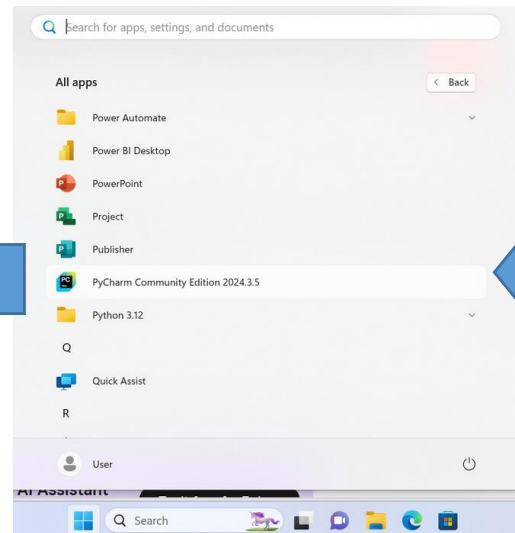
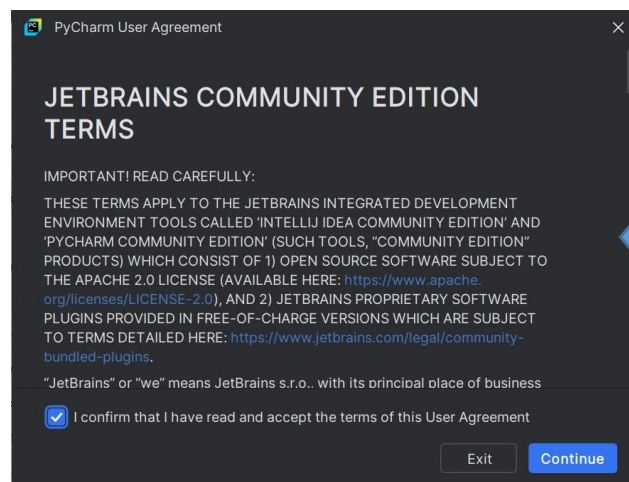
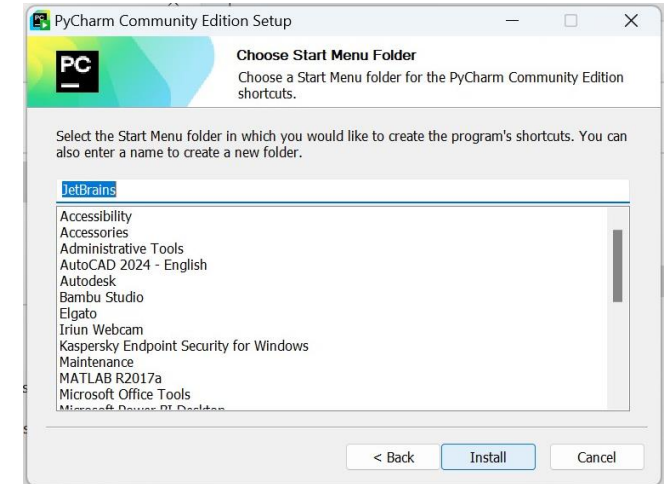
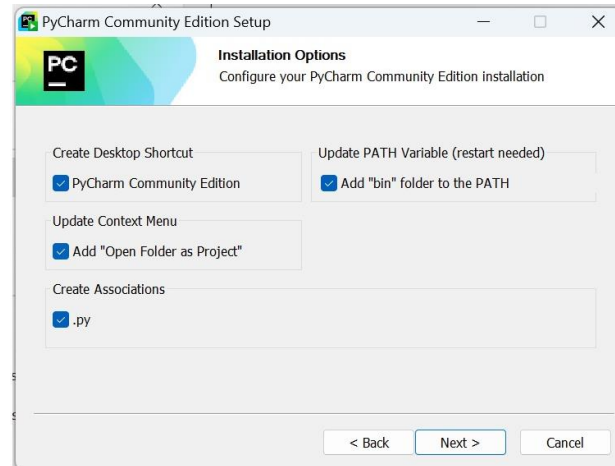
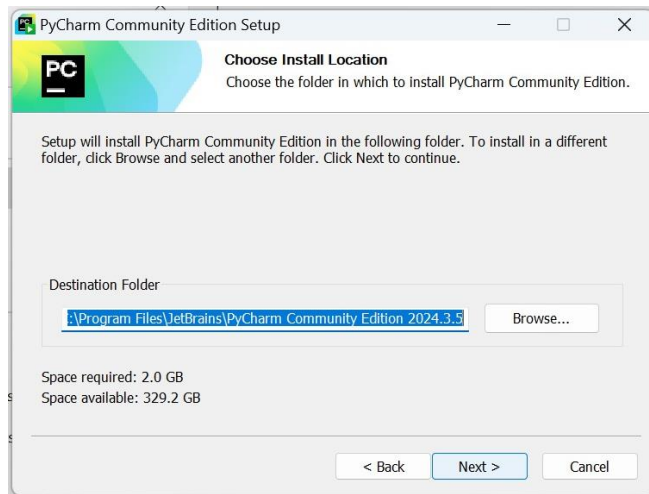
Thonny

PyCharm

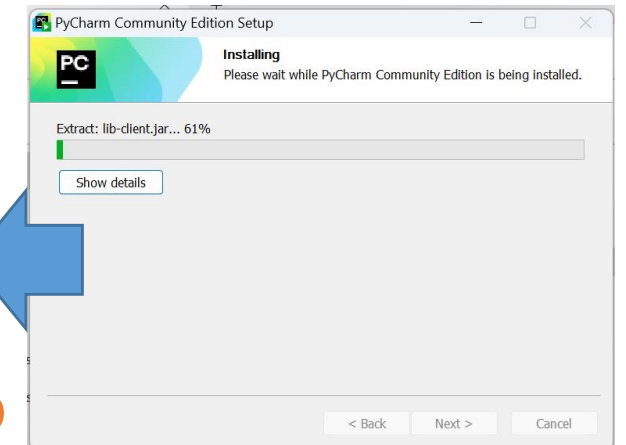
- Download PyCharm Community Edition
 1. Scroll down and find the PyCharm Community Edition. It is a free open source software. Click “Download”
 2. Go to Downloads folder and double click the `pycharm-community-2024.3.5.exe` file to start installation



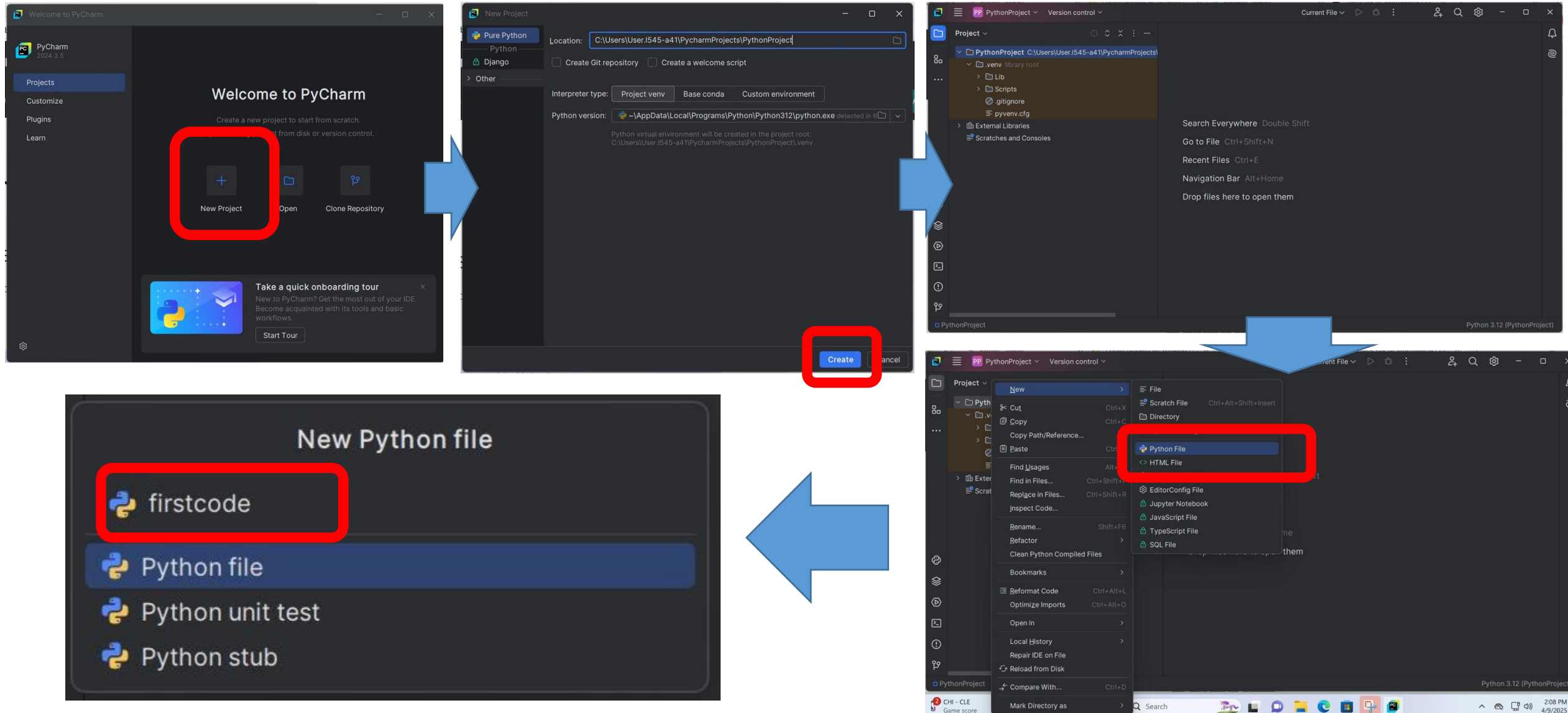
Install and run PyCharm (1)



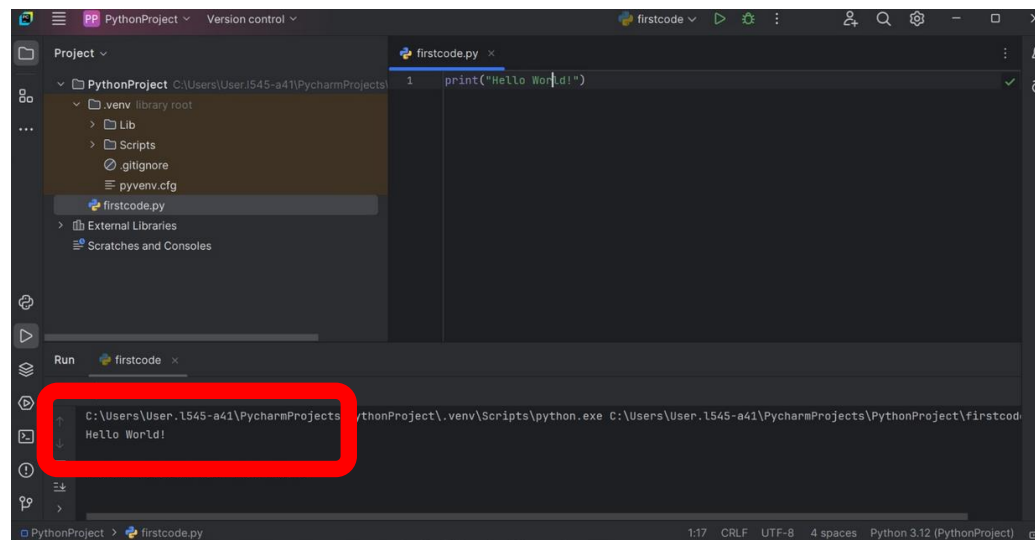
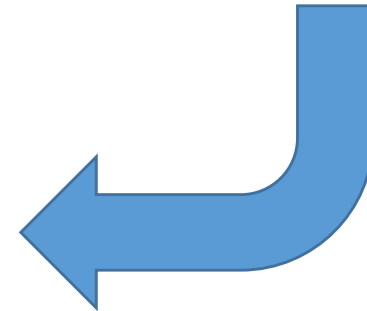
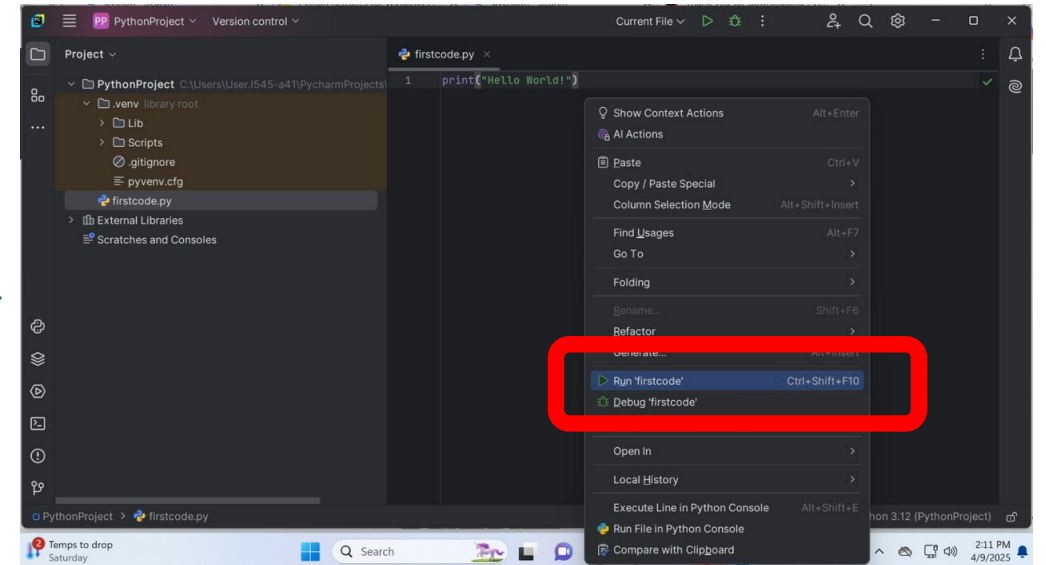
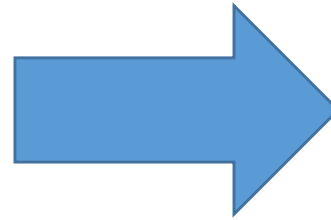
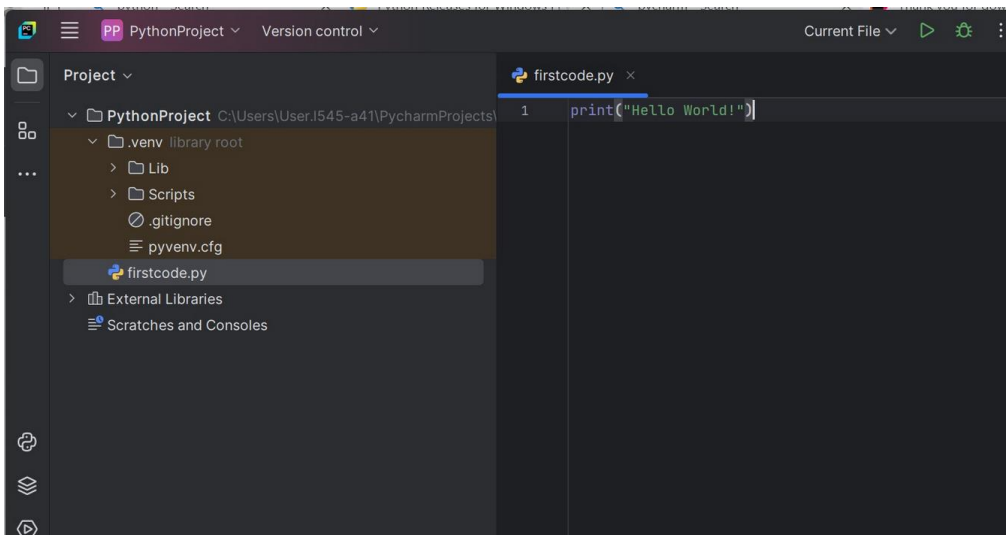
DO NOT
RESTART
YOUR
COMPUTER



Install and run PyCharm (2)

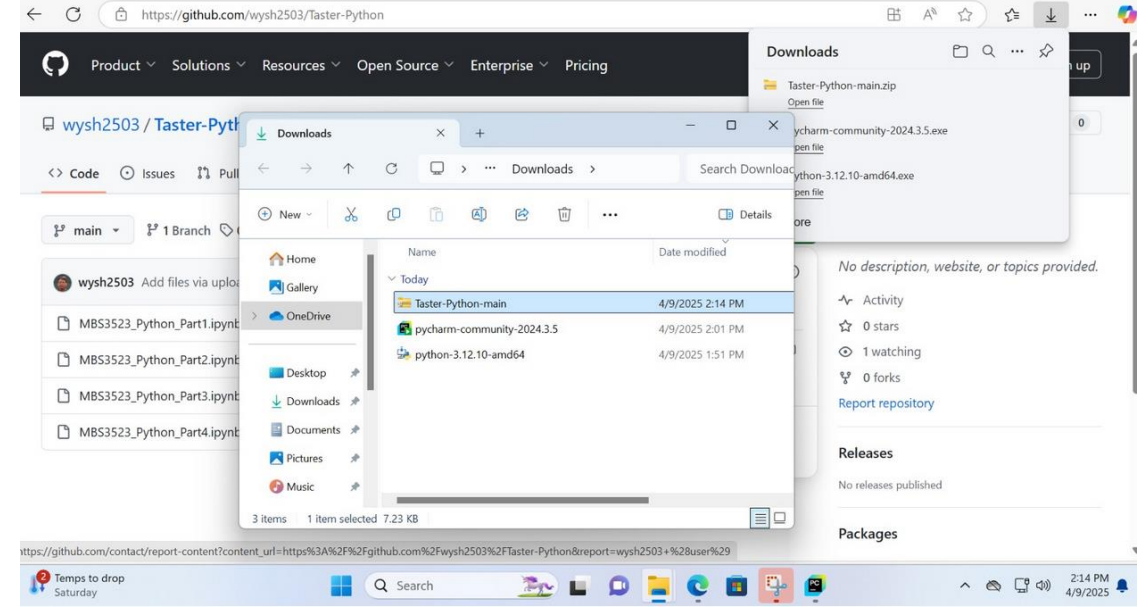
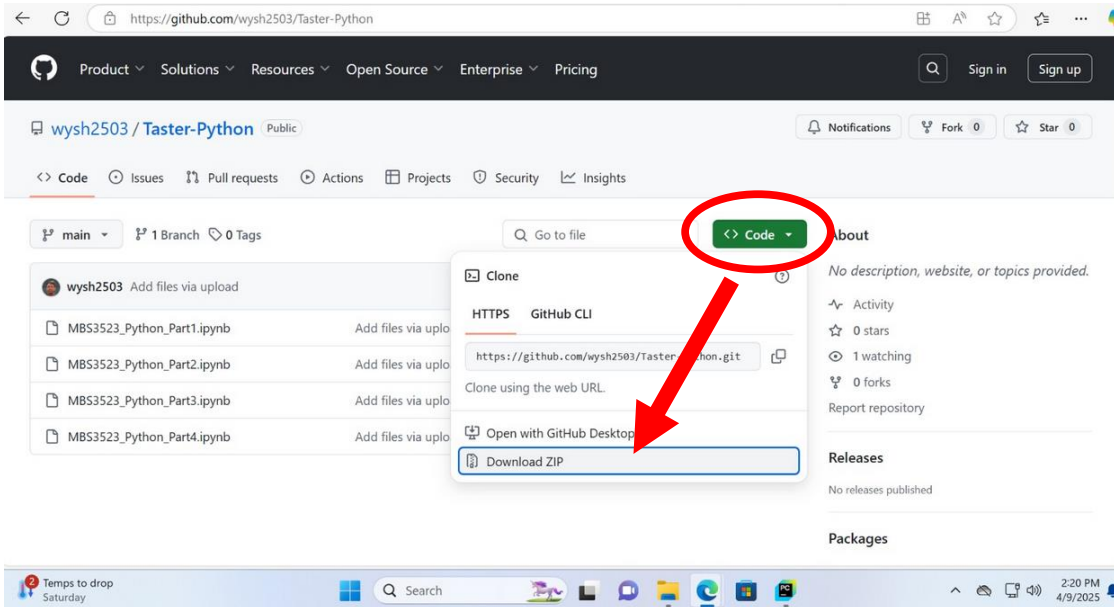


Install and run PyCharm (3)



Time for practice | 練習時間

- Get the file from <https://github.com/wysh2503/Taster-Python>
- Download the files (Code → Download ZIP), open the Download folder, right click the Taster-Python-main ZIP file and select “Extract All...” to unzip the folder, save them on your Desktop
- Drag and drop to your Jupyter Notebook



[1] 變數（variable）與資料類型（type）

- 變數是程式中用來暫存數據以作計算、輸入和輸出之用。
- 鍵入以下程式及運行：

```
strName = input ("Please enter your name:")  
print ("Hello " + strName)
```

輸出結果為：

```
Please enter your name: IVE(LEE WAI LEE) - ENGINEERING  
Hello IVE(LEE WAI LEE) - ENGINEERING  
>>> |
```

- **input()** 函數是讀取使用者的數據。
- **strName** 是一個變數，用來暫存使用者的名字 (例子中的 **IVE(LEE WAI LEE) - ENGINEERING**)。而它的類型 (type) 是字串 (string)。

[1] 變數（variable）與資料類型（type）

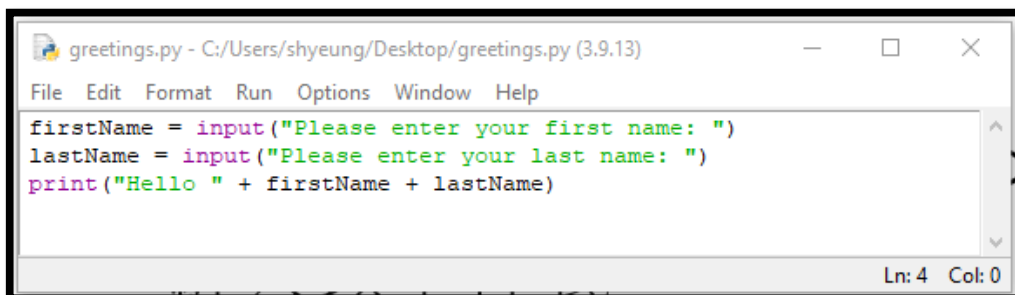
練習一

寫一個程式 (greetings.py)：讀取使用者的名字(first name)及姓氏(last name)，然後輸出 Hello [名字]及[姓氏]

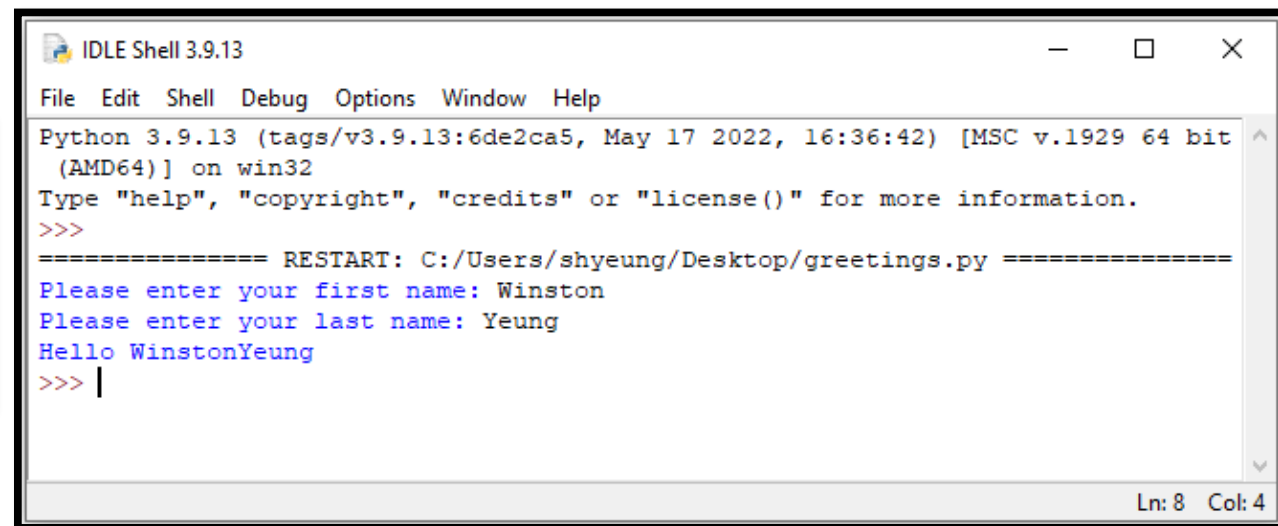
```
Please enter your first name: Winston
Please enter your last name: Yeung
Hello WinstonYeung
>>> |
```

練習一(答案)

- 使用Python IDLE



```
greetings.py - C:/Users/shyeung/Desktop/greetings.py (3.9.13)
File Edit Format Run Options Window Help
firstName = input("Please enter your first name: ")
lastName = input("Please enter your last name: ")
print("Hello " + firstName + lastName)
Ln: 4 Col: 0
```



```
IDLE Shell 3.9.13
File Edit Shell Debug Options Window Help
Python 3.9.13 (tags/v3.9.13:6de2ca5, May 17 2022, 16:36:42) [MSC v.1929 64 bit
(AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: C:/Users/shyeung/Desktop/greetings.py =====
Please enter your first name: Winston
Please enter your last name: Yeung
Hello WinstonYeung
>>> |
Ln: 8 Col: 4
```


[1] 變數（variable）與資料類型（type）

- 鍵入以下程式及運行 (add.py)：

```
num1 = int(input ("Please enter a number: "))  
num2 = int(input ("Please enter another number: "))  
add = num1 + num2  
print (num1, "+", num2, " = " + str(add))
```

輸出結果為：

```
Please enter a number:1  
Please enter another number:3  
1 + 3 = 4  
>>>
```

- `int()` 函數是將字串轉換為整數。
- `str()` 函數是將整數轉換為字串。
- `num1`和 `num2`是整數類型的變數，用來暫存使用者輸入的兩個整數。`add` 是用來暫存運算的結果及輸出時使用。

[1] 變數 (variable) 與資料類型 (type)

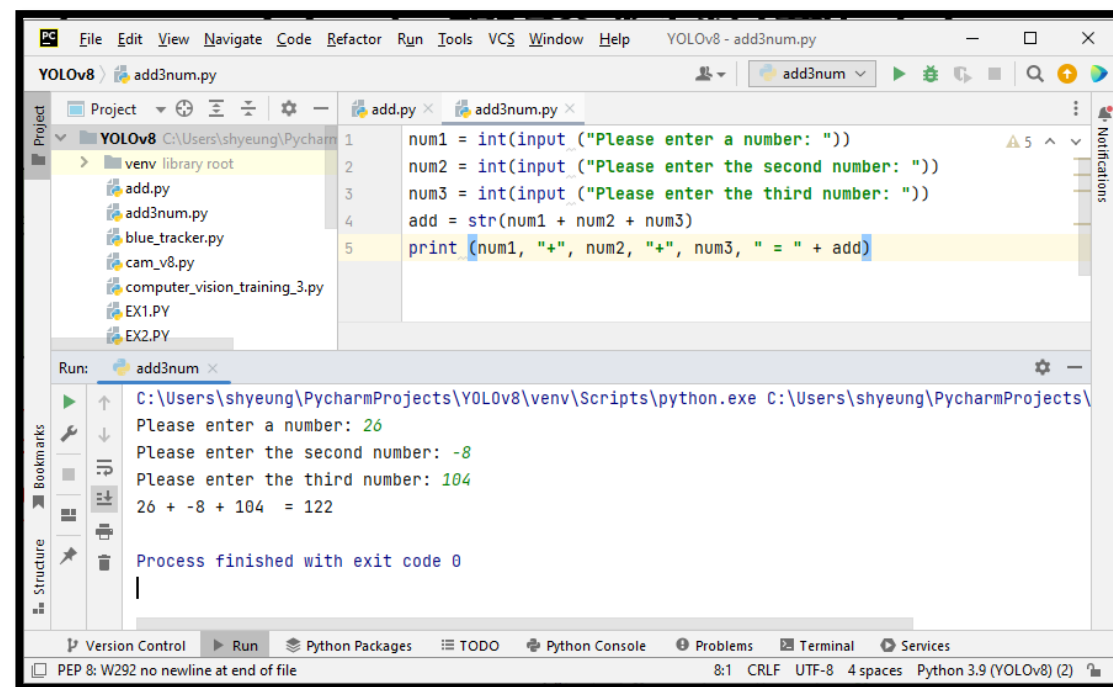
練習二

寫一個程式 (add3numbers.py)：讀取 3 個數字(num1, num2, num3)並將它們相加(add)

```
Please enter a number: 26
Please enter the second number: -8
Please enter the third number: 104
26 + -8 + 104 = 122
```

- 練習二(答案)
- 使用PyCharm
- Run the code and test with any 3 numbers

```
num1 = int(input("Please enter a number: "))
num2 = int(input("Please enter the second number: "))
num3 = int(input("Please enter the third number: "))
add = str(num1 + num2 + num3)
print(num1, "+", num2, "+", num3, "= " + add)
```



[2] Conditionals | 選擇 (if ... else .../ if ... elif ... else)

- 寫程式時，很多時需要作分流處理。例如測驗成績達40分為合格，否則為不合格；使用者為男或女，會有不同的處理。這時可以使用 if - else 敘述。鍵入以下程式及運行 (M_F_selection.py)：

```
sex = str(input ("Your test sex (male/female): "))  
# check the test mark {# 符號是用來加入注解，編程器會跳過這部份。}  
if sex == "male":  
    print("Go to the LEFT toilet!")  
else:  
    print("Go to the RIGHT toilet!")
```

輸出結果為：

```
Your test sex (male/female): male  
Go to the LEFT toilet!
```

```
Your test sex (male/female): female  
Go to the RIGHT toilet!
```

如果 `sex == "male"` 的檢查結果為真(True)時，程式會執行 `if` 以下的敘述，上例是：`print("Go to the LEFT toilet!")`，否則會執行 `else` 以下的敘述，上例是：`print("Go to the RIGHT toilet!")`。

注意：程式中的 `:` 及 縮排(Indentation)。

[2] Conditionals | 選擇 (if ... else .../ if ... elif ... else)

練習三

寫一個程式 (checkGrade.py)：讀取測驗成績，然後根據下列表格輸出適當的等級：

測驗成績	等級
≥ 80	Pass with Distinction
$60 < 80$	Pass with Credit
$40 < 60$	Pass
< 40	Fail

- 練習三(答案)
- 使用 **PyCharm**
- Run the code and test with the following marks:
 - 85, 67, 42.5, 30

```
testMark = float(input ("Your test mark: "))
# check the test mark
if testMark >= 80:
    print("Pass with Distinction!!")
elif testMark >=60 and testMark<80:
    print("Pass with Credit!")
elif testMark >=40 and testMark < 60:
    print("Pass!")
else:
    print("Fail!")
```

[3] Loop | 迴圈 (for, while)

- 編寫程式時，有時需要重複或搜索某一記錄，可以用 **for** 或 **while**。例如要列印 5 行 Hello World，可以執行以下敘述：

```
print ("Hello World")
print ("Hello World")
print ("Hello World")
print ("Hello World")
print ("Hello World")
```

- 但如果要列印 100 行，以上方法便不太方便。
- 使用迴圈 **for**：鍵入以下程式及運行 (forLoopHello.py)：

```
for i in range (0,5):
    print ("Hello World")
```

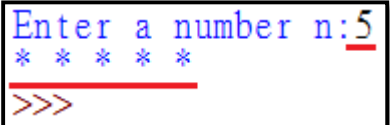
- 或者
- 使用迴圈 **while**：鍵入以下程式及運行 (whileLoopHello.py)：

```
i = 0
while i < 5:
    print ("Hello World")
    i = i + 1
```


[3] Loop | 迴圈 - Nested Loops 巢狀迴圈

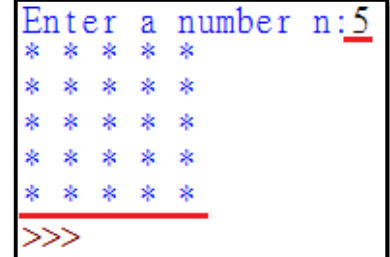
- 鍵入以下程式及運行 (printStar.py) :

```
n = int (input("Enter a number n:"))  
for i in range (0, n):  
    print("* ", end="")
```

- 輸出結果為：

- In Python, a **loop inside a loop** is known as a **nested loop** (巢狀迴圈).
- 加多一個迴圈 (printStar2loop.py)

```
n = int (input("Enter a number n:"))  
for j in range (0, n):  
    for i in range (0, n):  
        print("* ", end="")  
    print ("")
```

- 輸出結果為：

[3] Loop | 迴圈 - Nested Loops 巢狀迴圈

練習四

修改以上程式去列印下列結果：

```
Enter a number n:5
*
* *
* * *
* * * *
* * * * *
>>>
```

```
Enter a number n:5
* * * * *
* * * *
* * *
* *
*
>>>
```

- 練習四(答案)
- 使用PyCharm

```
n = int (input("Enter a number n:"))
for j in range (0, n):
    for i in range (0,   ):
        print("* ", end="")
    print ("")
```

```
n = int (input("Enter a number n:"))
for j in range (0, n):
    for i in range (0,   ):
        print("* ", end="")
    print ("")
```

[4] Library/Standard Library | 函式庫

- 鍵入以下程式 (pythagoras.py)

```
import math
a = float(input("a= "))
b = float(input("b= "))
c = math.sqrt(a*a + b*b)
print ("c= %.2f" % c)
```

- **import math** 載入函式庫 **math**，使用**math.sqrt** 來計算開方。
- Try and run the code

```
a= 21
b= 8
c= 22.47
```

```
a= 3
b= 4
c= 5.00
```

[5] Python Functions | 函数

- A function is a block of code which only runs when it is called.
- You can pass data, known as parameters, into a function.
- A function can return data as a result.

```
def printString( strPrint, n):
    for i in range (0, n):
        print (strPrint)

printString ("This Taster Programme is interesting", 6)
```

- Result

[illegible]

[5] Python Functions | 函数

- Sometimes you might want to return the calculated/manipulated result from the function:

```
def addition(num1, num2):  
    answer = num1 + num2  
    return answer  
a = float(input("a="))  
b = float(input("b="))  
print(a, "+", b, "= %.2f" % addition(a, b))
```

- Result

a=3.8

b=6.9

3.8 + 6.9 = 10.70

Inclass Exercise 1

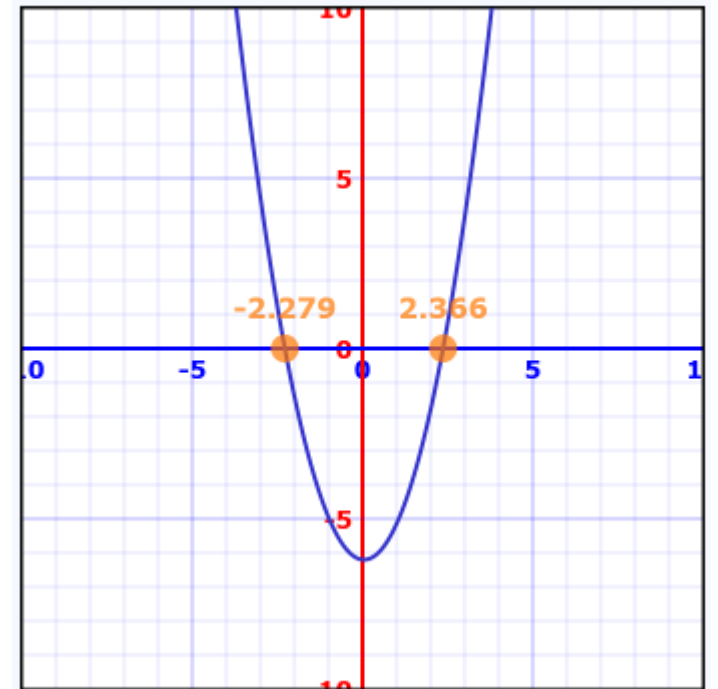
- 寫一個Python 程式碼 (QuadraticEquation.py) 來找出二次方程式的根 (當 $y = 0$ 時)

- Given: $y = 1.15x^2 + 0.1x - 6.2$
- Write a Python code to find the roots (when $y = 0$) of the above quadratic equation

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Reference:

<https://www.mathsisfun.com/algebra/quadratic-equation-graph.html>



Inclass Exercise 2

- 寫一個程式 (calculator.py)：讀取兩個實數及一個運算符號，然後輸出其運算結果。[注意：程式中需要使用函數。]

實數1	實數2	運算符號	計算
a	b	+(加)	$a + b$
a	b	-(減)	$a - b$
a	b	*(乘)	$a * b$
a	b	/(除)	a / b
a	b	^(次方)	$a ^ b$

```
Plesae enter a number:3
Plesae enter another number:4
Please enter the operator + - * / ^: +
3.0 + 4.0 = 7.00
```

```
Plesae enter a number:3
Plesae enter another number:4
Please enter the operator + - * / ^: -
3.0 - 4.0 = -1.00
```

```
Plesae enter a number:3
Plesae enter another number:4
Please enter the operator + - * / ^: *
3.0 * 4.0 = 12.00
```

```
Plesae enter a number:3
Plesae enter another number:4
Please enter the operator + - * / ^: /
3.0 / 4.0 = 0.75
```

Suggested answer for Inclass Exercise 1

```
import math
```

```
# Define coefficients
```

```
a = 1.15 # coefficient of x2
```

```
b = 0.1 # coefficient of x
```

```
c = -6.2 # constant term
```

```
# Method 1: Using quadratic formula
```

```
# Quadratic formula:  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ 
```

```
discriminant = b**2 - 4*a*c
```

```
if discriminant < 0:
```

```
    print("No real roots exist (discriminant < 0)")
```

```
elif discriminant == 0:
```

```
    x = -b / (2*a)
```

```
    print(f"One real root: x = {x:.4f}")
```

```
else:
```

```
    x1 = (-b + math.sqrt(discriminant)) / (2*a)
```

```
    x2 = (-b - math.sqrt(discriminant)) / (2*a)
```

```
    print("Two real roots:")
```

```
    print(f"x1 = {x1:.4f}")
```

```
    print(f"x2 = {x2:.4f}")
```



Thank You!

The image shows a close-up of a computer keyboard. A single, large, blue key is the central focus, featuring the words "Thank You!" in a white, sans-serif font. This key is surrounded by standard white keyboard keys. Visible keys include the hyphen/underscore key, the backslash/brace key, the semicolon/apostrophe key, the arrow key, and the "alt" key. The lighting is soft, highlighting the texture of the keys and the vibrant blue of the custom key.