Basic Python Programming

[Session 1] Getting Started with Python

ITinerary X University of Ghana

Contents

- Programming
- Intro. to Python
- Installation
- “Hello, world!”
- Basic Concepts
- Exercises

Programming

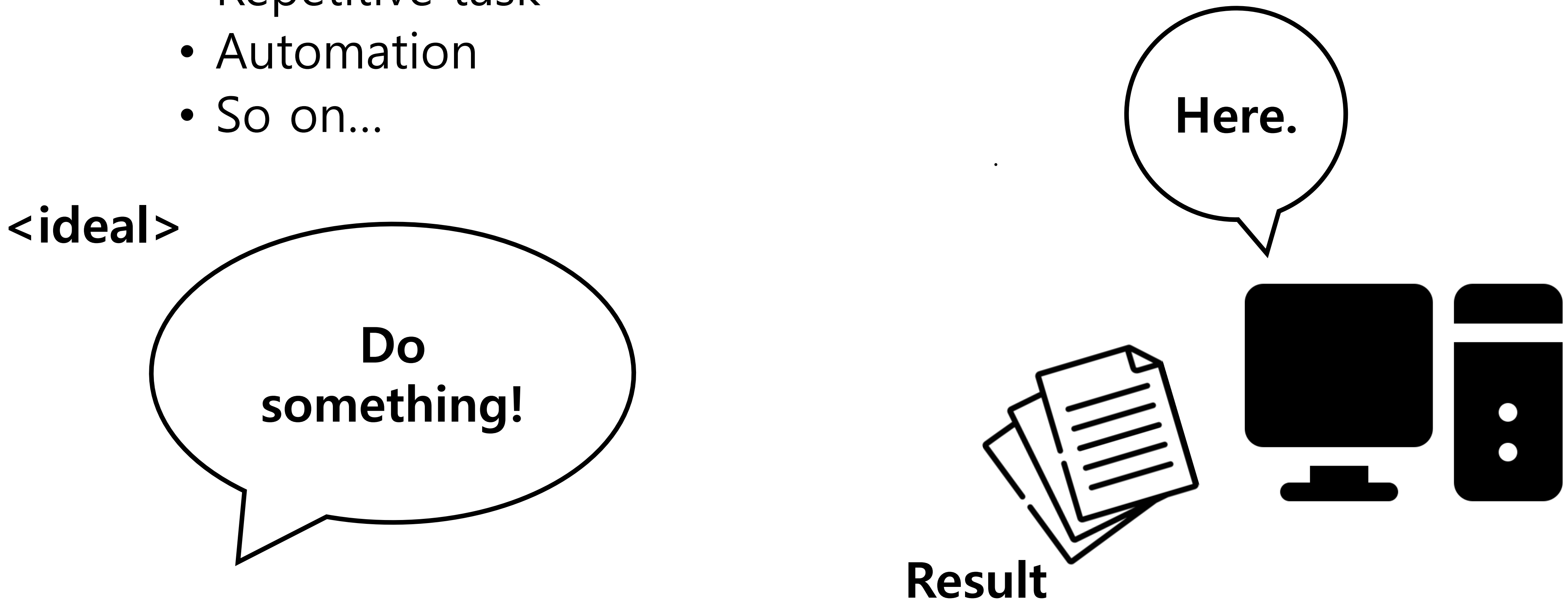
It matters to all of us today

Programming [1]

- **What is programming?**

Programming [2]

- **Computer does many task for us**
    - Fast calculation
    - Repetitive task
    - Automation
    - So on…



<ideal>

Do something!

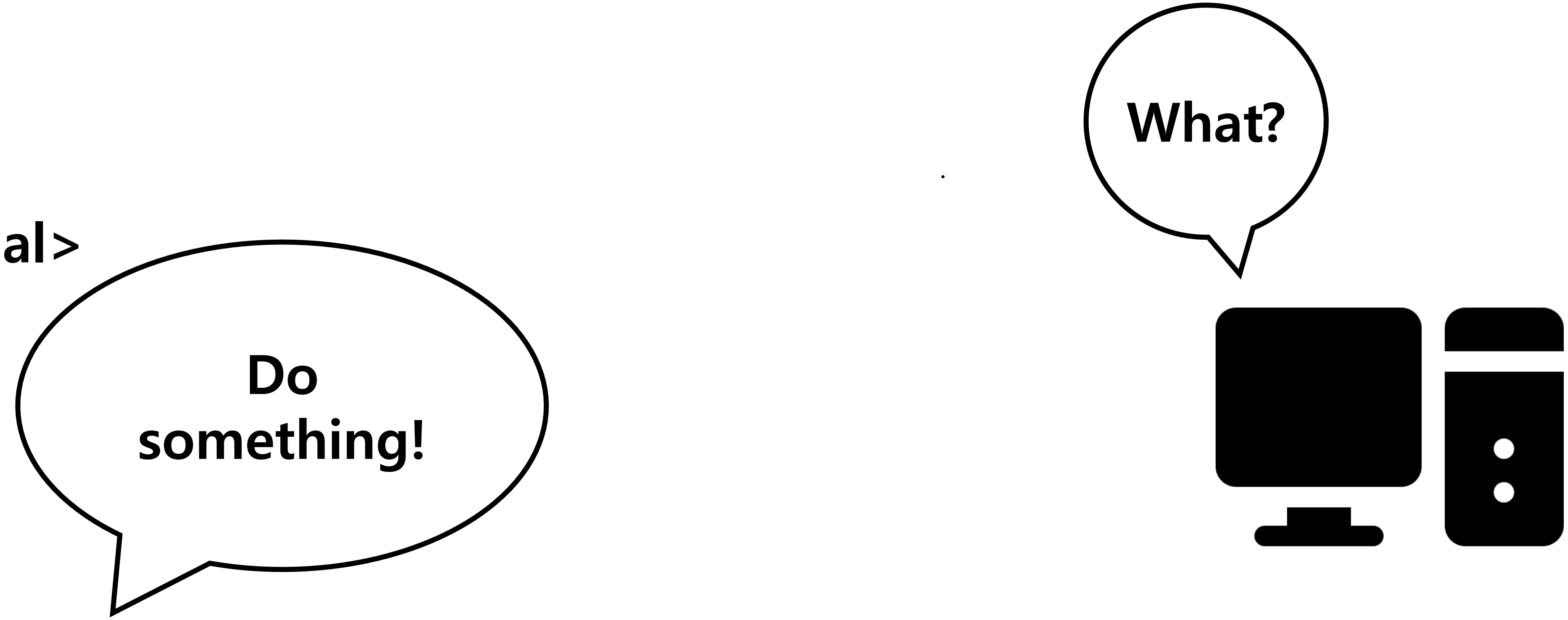
Here.

Result

Programming [3]

- **Unfortunately, computer cannot understand what we say**

<actual>

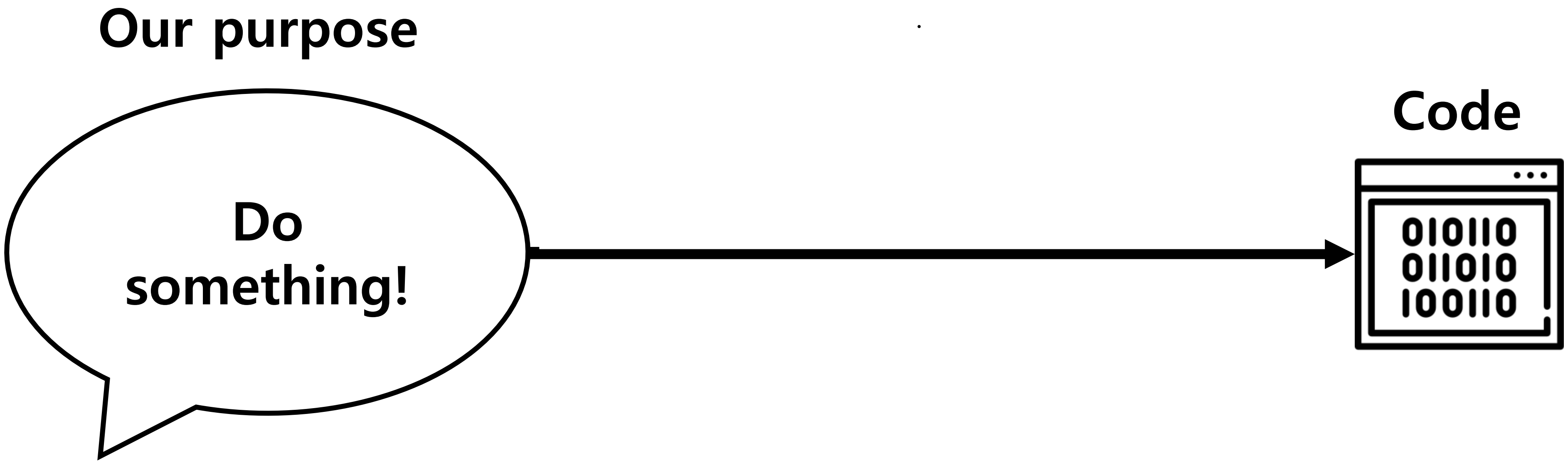


Do something!

What?

Programming [4]

- **Programming is a translation our purpose into the instruction(code).**



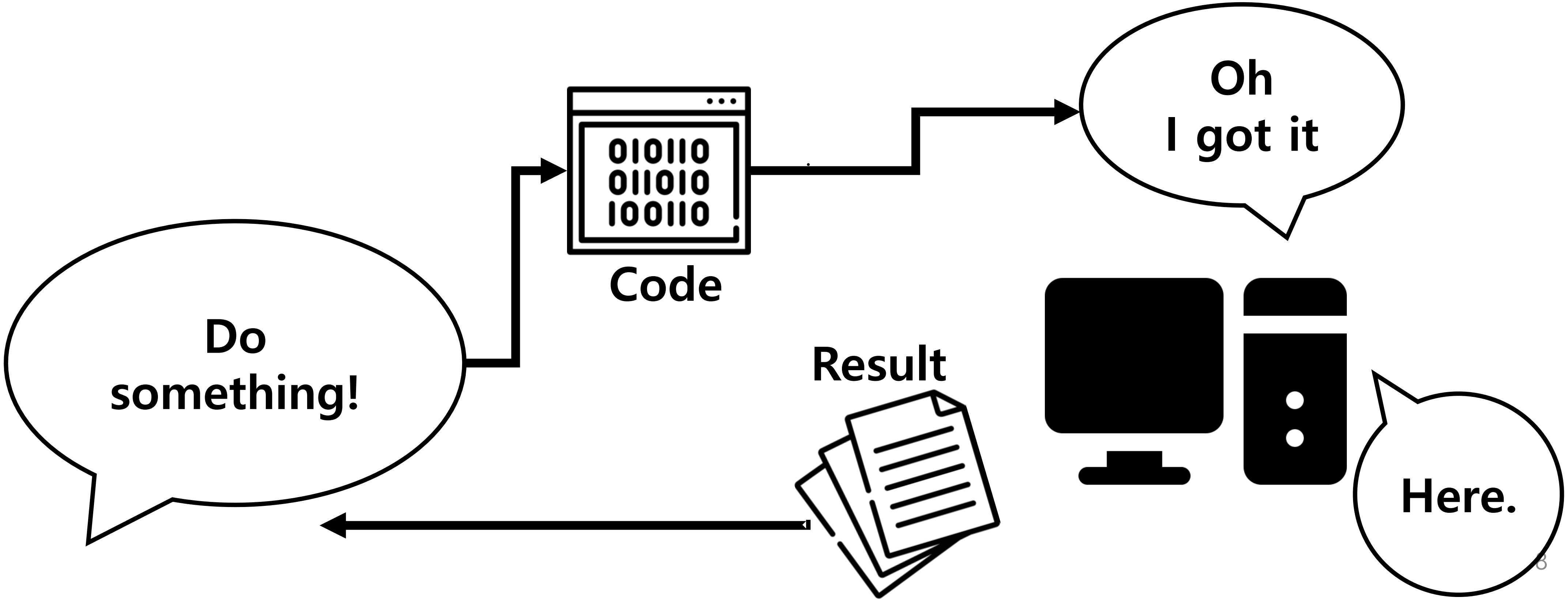
Our purpose

Do something!

Code

Programming [5]

- Programming is the way to get computer to work according to our purpose



Do something!

Code

Oh
I got it

Here.

Result

Programming [6]

- Then, why should we learn programming?

Programming [7]

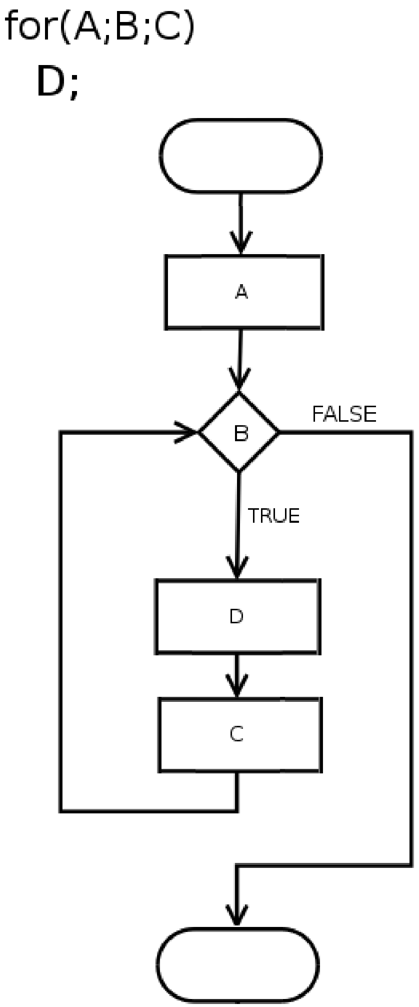
- **Programming can be a “tool”**
  - We can use it in many ways
  - It eases our life

Programming [8]

- **Programming is involved in many fields already.**
  - AI
  - Data science
  - Bioinformatics
  - Chemical / Physical simulation
  - Robotics
  - Mathematics
  - Economics
  - …

Programming [9]

- **Programming is helpful for logical thinking**
    - Algorithm
    - Logical flow
    - Prediction
    - …



```
for(A;B;C)
  D;
```

Programming [10]

- **Then, let’s start!**

Intro. to Python

Python?

- **Python is a programming language used in many fields.**

- **It is “very” popular programming language, why?**
  - Easy to learn
  - Easy to program
  - Many developers made useful libraries
  - There are lots of documents, guides, and forums

Is Python Easy?

- Well… at least easier than other languages

Why Python in This Course? [1]

- Python has a lot of libraries, so we can make various program with Python

Why Python in This Course? [2]

- **By using easy-to-learn language, we can focus on the BIG PICTURE of programming**
  - How to solve the given problem
  - Algorithmic / computational thinking
  - Logical flow of programs
  - So on…

Installation

We need…

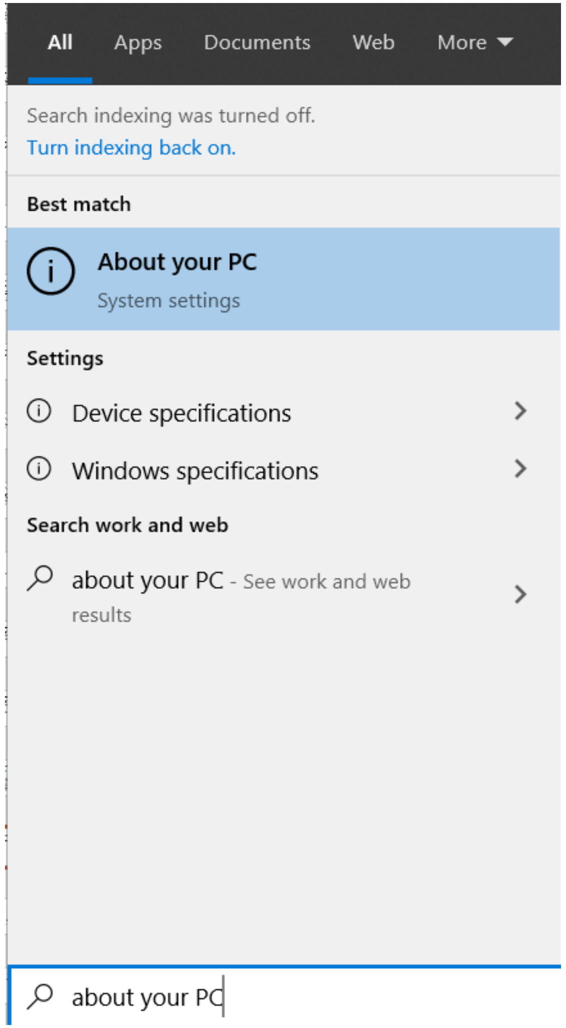
- **Python 3.7.8**
  - Interpreter for Python language
  - Be careful of the version!

- **PyCharm**
  - Editor(IDE) for Python

- **Recommend to use Windows 10**
  - Ubuntu, MacOS, etc. are also OK.
  - But the procedure is slightly different

Installing Python [1]

- Check your PC



Search indexing was turned off.
Turn indexing back on.

Best match

About your PC
System settings

Settings

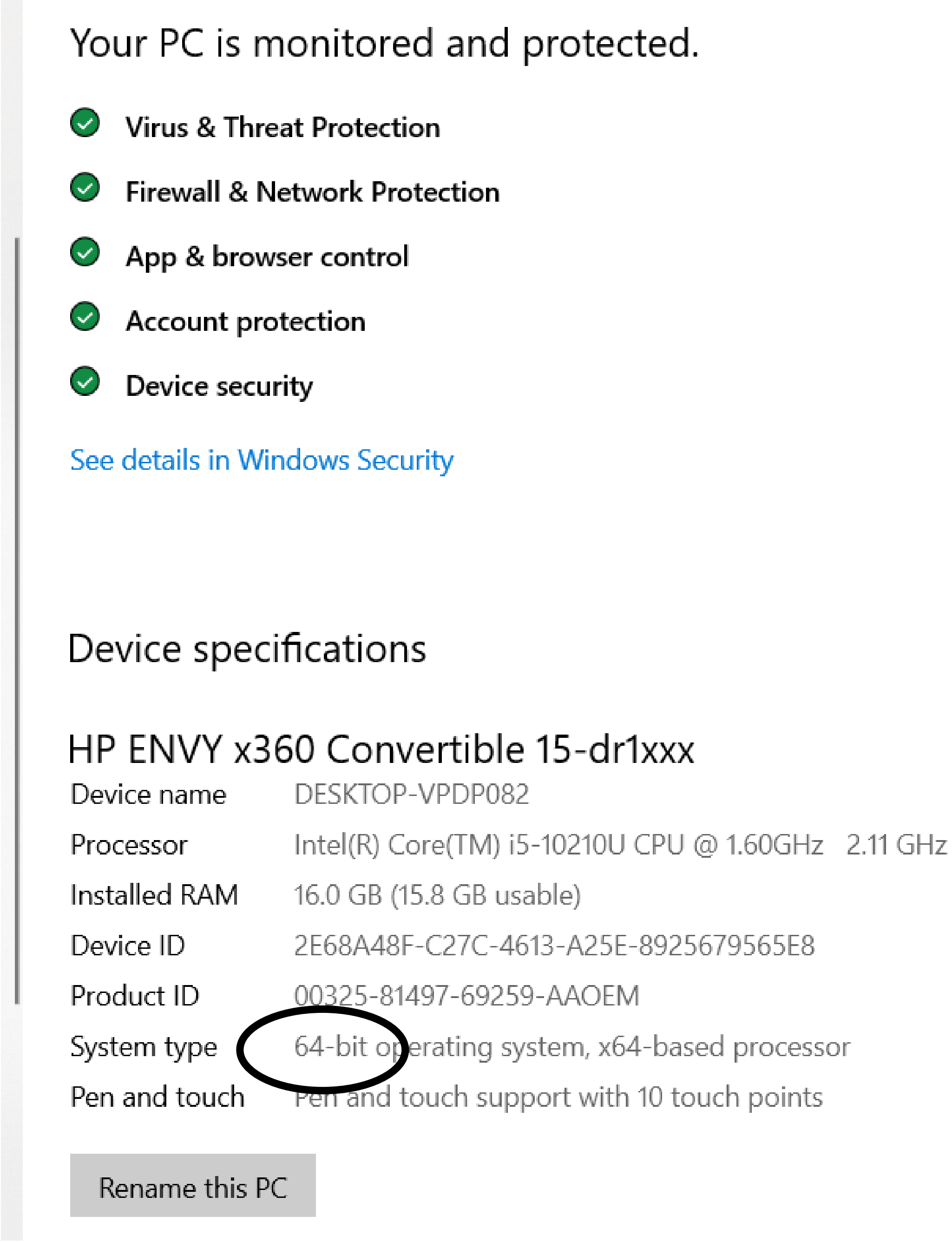
Device specifications

Windows specifications

Search work and web

about your PC - See work and web results

about your PC



Your PC is monitored and protected.

- ✓ Virus & Threat Protection
- ✓ Firewall & Network Protection
- ✓ App & browser control
- ✓ Account protection
- ✓ Device security

See details in Windows Security

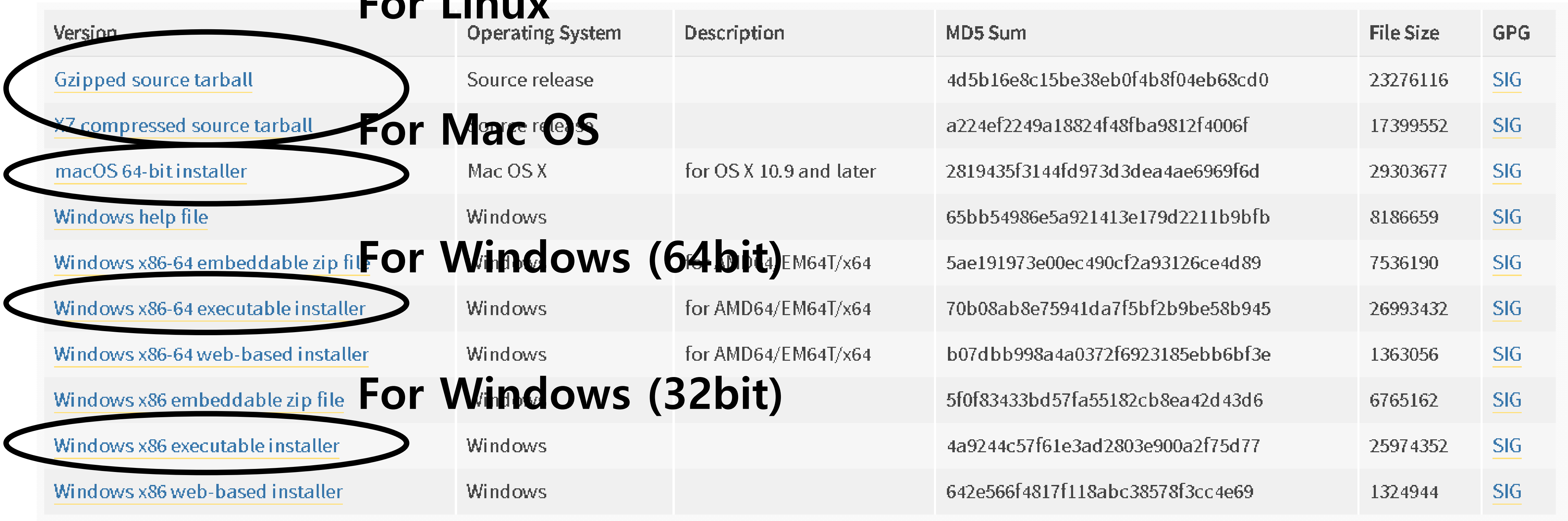
Device specifications

HP ENVY x360 Convertible 15-dr1xxx

Device name	DESKTOP-VPDP082
Processor	Intel(R) Core(TM) i5-10210U CPU @ 1.60GHz 2.11 GHz
Installed RAM	16.0 GB (15.8 GB usable)
Device ID	2E68A48F-C27C-4613-A25E-8925679565E8
Product ID	00325-81497-69259-AAOEM
System type	64-bit operating system, x64-based processor
Pen and touch	Pen and touch support with 10 touch points

Installing Python [2]

- https://www.python.org/downloads/release/python-378/



Version	Operating System	Description	MD5 Sum	File Size	GPG
Gzipped source tarball	Source release		4d5b16e8c15be38eb0f4b8f04eb68cd0	23276116	SIG
XZ compressed source tarball	Source release		a224ef2249a18824f48fba9812f4006f	17399552	SIG
macOS 64-bit installer	Mac OS X	for OS X 10.9 and later	2819435f3144fd973d3dea4ae6969f6d	29303677	SIG
Windows help file	Windows		65bb54986e5a921413e179d2211b9bfb	8186659	SIG
Windows x86-64 embeddable zip file	Windows	for AMD64/EM64T/x64	5ae191973e00ec490cf2a93126ce4d89	7536190	SIG
Windows x86-64 executable installer	Windows	for AMD64/EM64T/x64	70b08ab8e75941da7f5bf2b9be58b945	26993432	SIG
Windows x86-64 web-based installer	Windows	for AMD64/EM64T/x64	b07dbb998a4a0372f6923185ebb6bf3e	1363056	SIG
Windows x86 embeddable zip file	Windows		5f0f83433bd57fa55182cb8ea42d43d6	6765162	SIG
Windows x86 executable installer	Windows		4a9244c57f61e3ad2803e900a2f75d77	25974352	SIG
Windows x86 web-based installer	Windows		642e566f4817f118abc38578f3cc4e69	1324944	SIG

For Linux

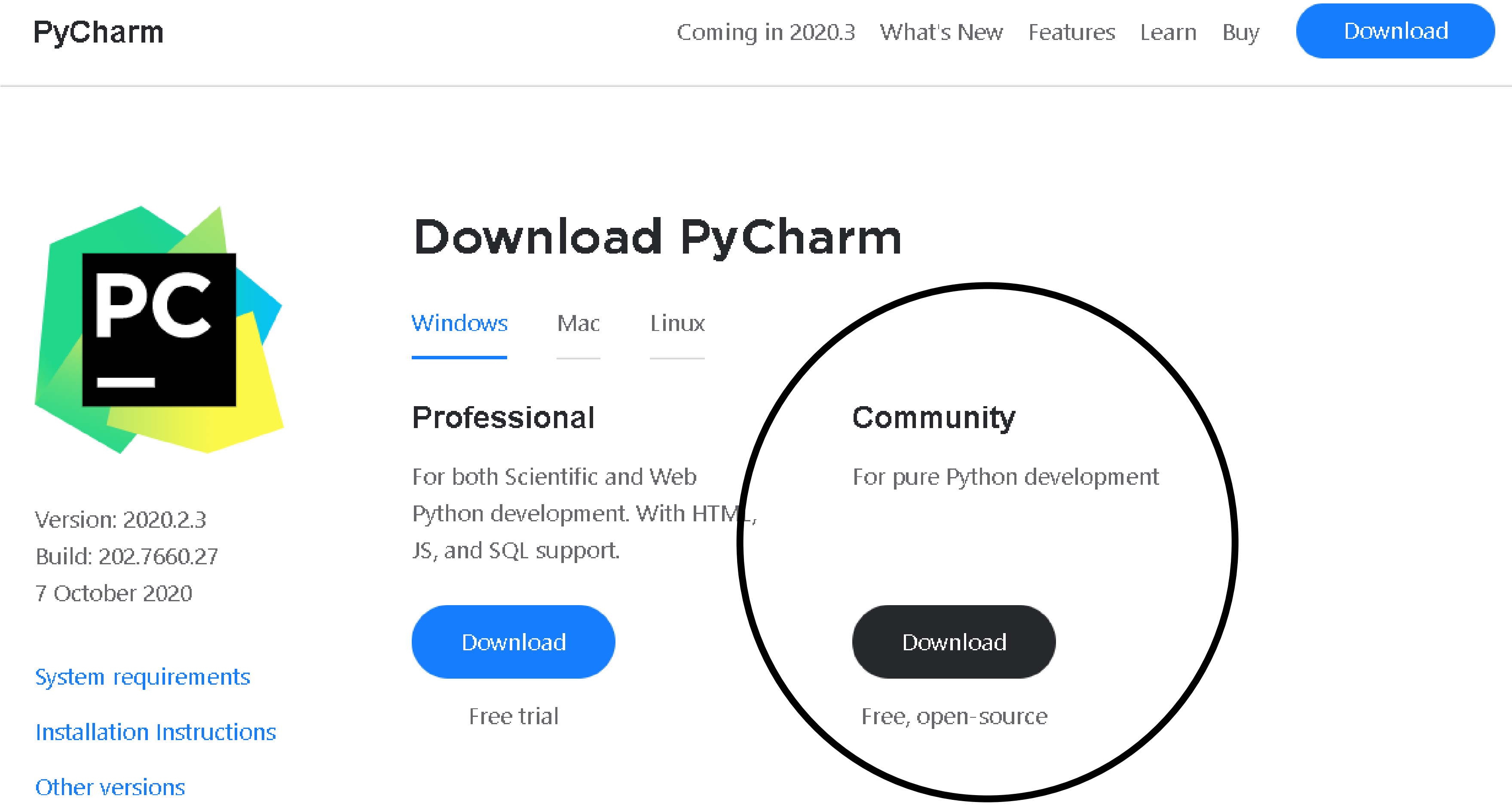
For Mac OS

For Windows (64bit)

For Windows (32bit)

Installing PyCharm

- https://www.jetbrains.com/pycharm/download/



Download PyCharm

Version: 2020.2.3
Build: 202.7660.27
7 October 2020

Professional

For both Scientific and Web Python development. With HTML, JS, and SQL support.

Free trial

Community

For pure Python development

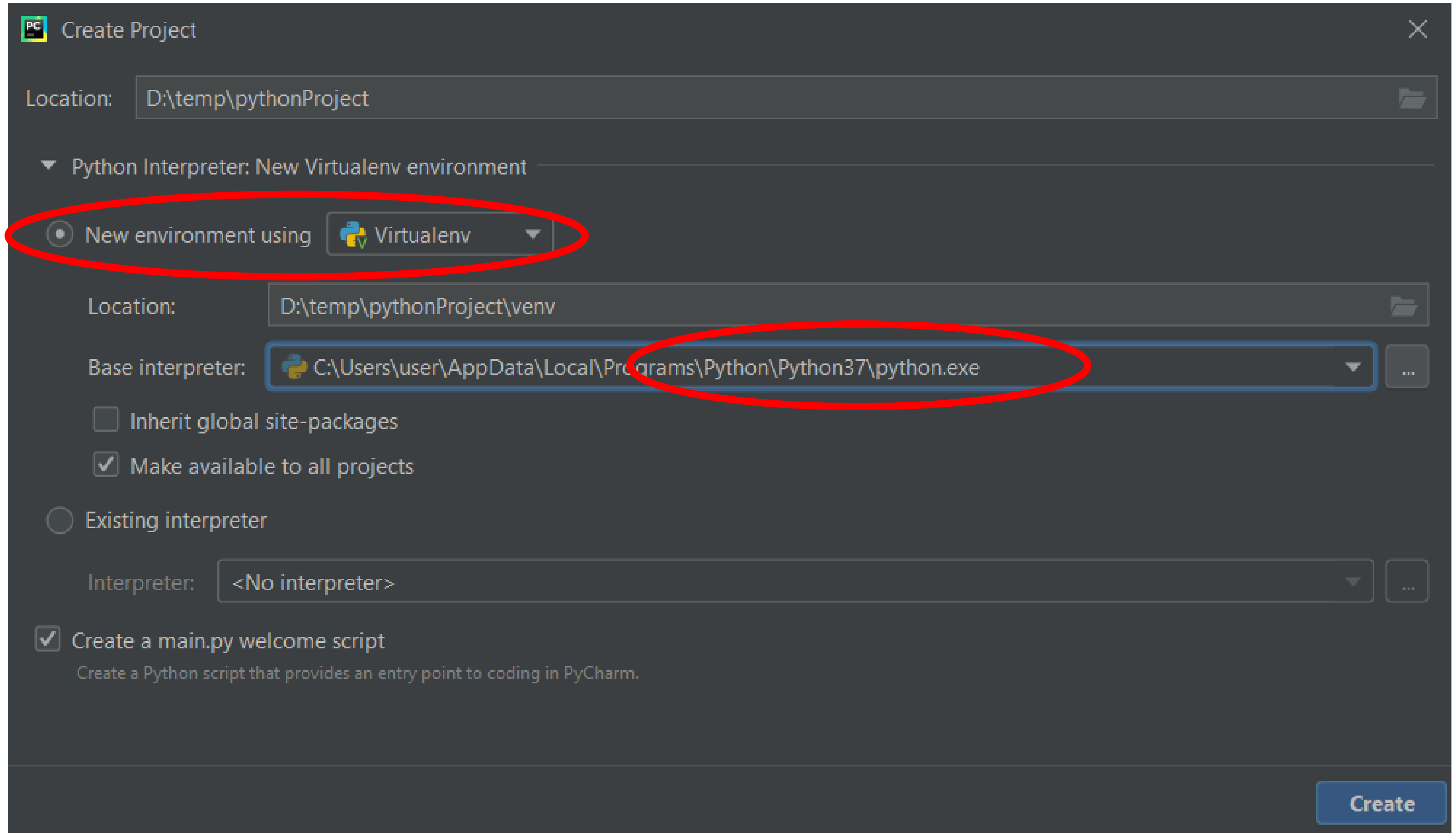
Free, open-source

Hello, World!

The beginning of everything

Looking around PyCharm [1]

- **Create a new project**



Create Project

Location: D:\temp\pythonProject

Python Interpreter: New Virtualenv environment

● New environment using Virtualenv

Location: D:\temp\pythonProject\venv

Base interpreter: C:\Users\user\AppData\Local\Programs\Python\Python37\python.exe

□ Inherit global site-packages

☑ Make available to all projects

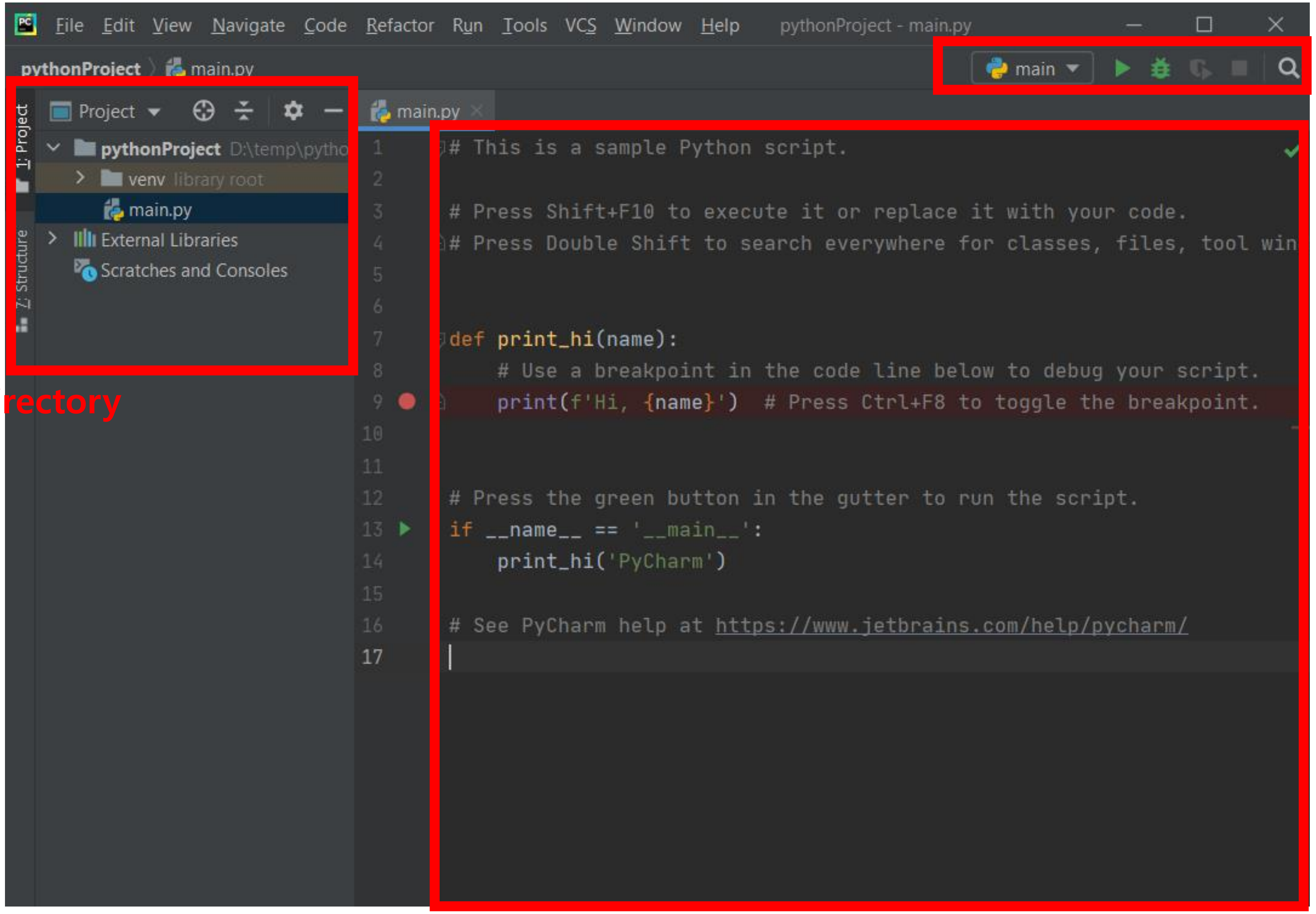
○ Existing interpreter

Interpreter: <No interpreter>

☑ Create a main.py welcome script

Create a Python script that provides an entry point to coding in PyCharm.

Looking around PyCharm [2]



```python
# This is a sample Python script.

# Press Shift+F10 to execute it or replace it with your code.
# Press Double Shift to search everywhere for classes, files, tool win


def print_hi(name):
    # Use a breakpoint in the code line below to debug your script.
    print(f'Hi, {name}')  # Press Ctrl+F8 to toggle the breakpoint.


# Press the green button in the gutter to run the script.
if __name__ == '__main__':
    print_hi('PyCharm')

# See PyCharm help at https://www.jetbrains.com/help/pycharm/

```

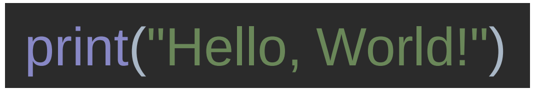
Running / Debugging

Project directory

Code

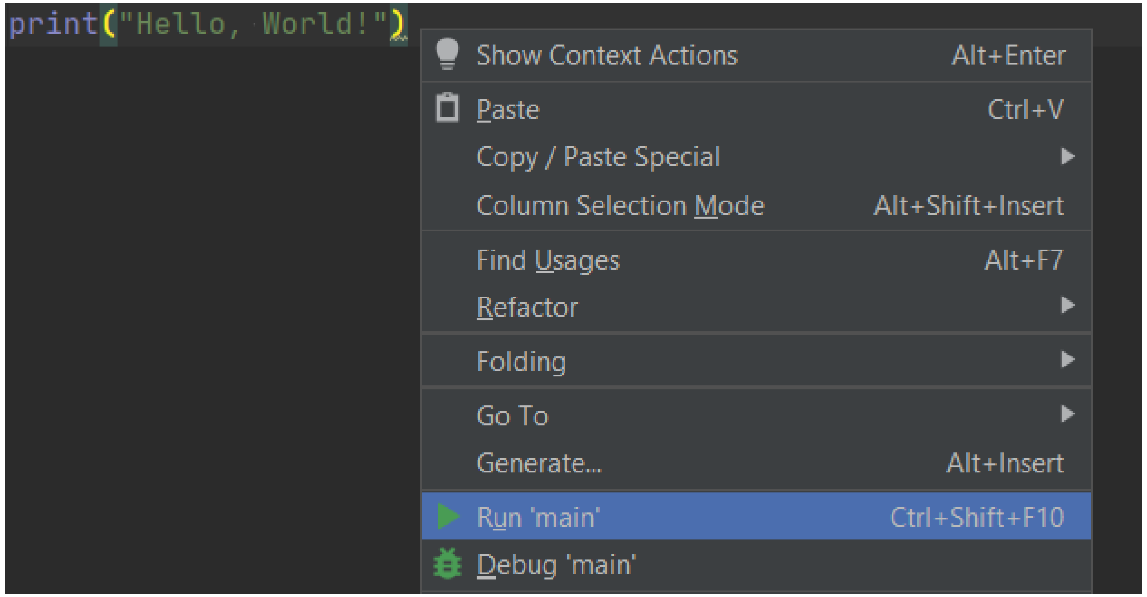
Printing “Hello, World!” [1]

- Erase all and write this:



```
print("Hello, World!")
```

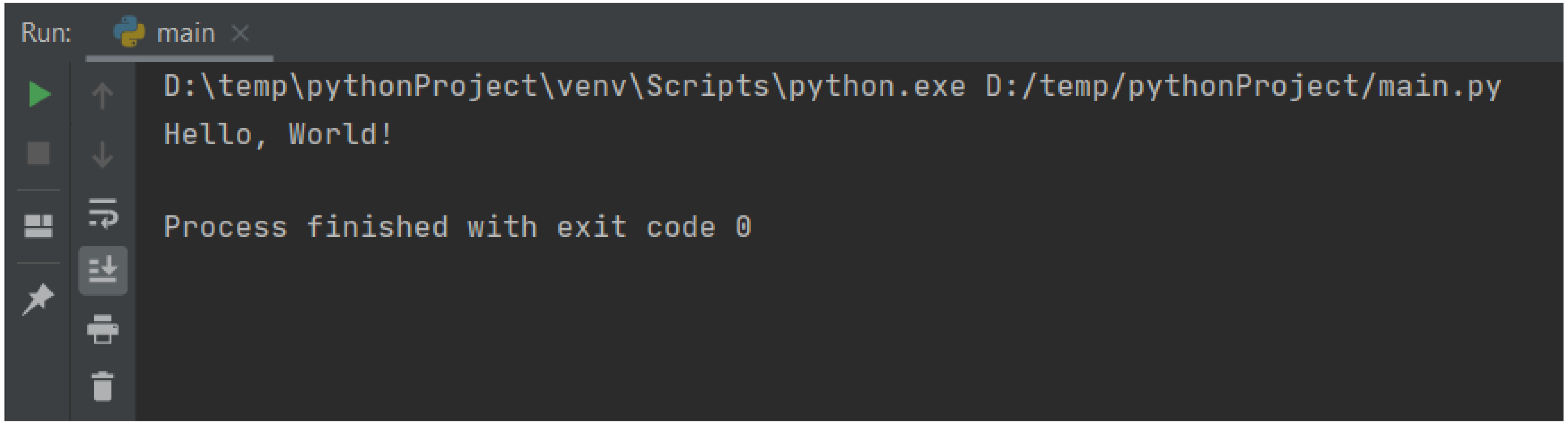
- Right-click and Run ‘main’



```
print("Hello, World!")
```

Printing “Hello, World!” [2]

- **Was it successful?**



```
D:\temp\pythonProject\venv\Scripts\python.exe D:/temp/pythonProject/main.py
Hello, World!

Process finished with exit code 0
```

Basic Concepts [1]

`print()` Function [1]

- Almost everything can be printed out by `print()` function

- We should be able to use this function to see our code’s result.

```
print(contents)
```

`print()` Function [2]

- **Note that:**
  - Contents can be variable, value, or expression
  - We can print multiple things, with “,”
    - `print(10, 20, 30)`

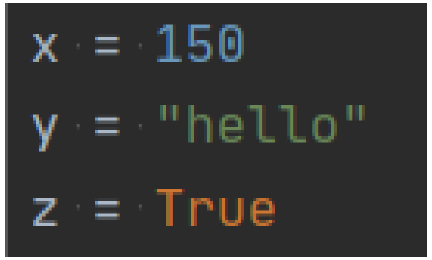
- **Practice yourself!**

Variables [1]

- **Variable is a name containing some value.**

- **For example,** `x = 150` **is a variable named “x”, containing a value, 150.**

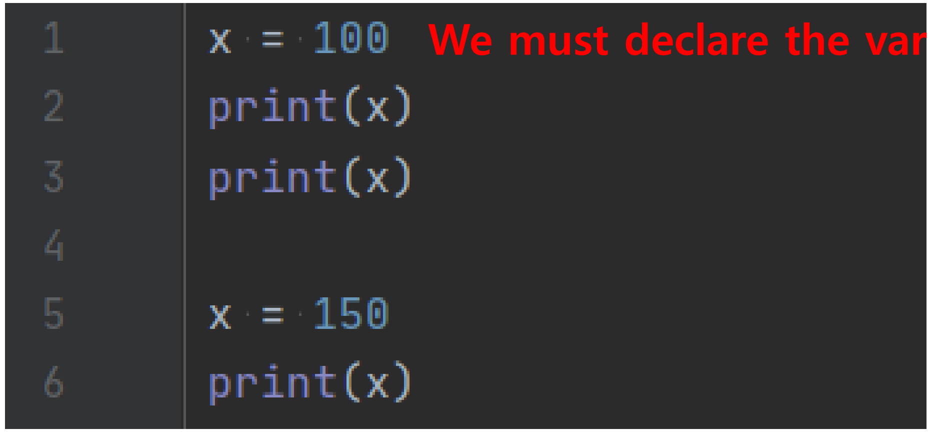
- **It can contain various type of value**



```python
x = 150
y = "hello"
z = True
```

Variables [2]

- **How can we use variable?**



```
x = 100
print(x)
print(x)

x = 150
print(x)
```

We must declare the variable before use!!!

- **From this, we can know:**
  - Variable can be reused
  - The value in a variable can be changed

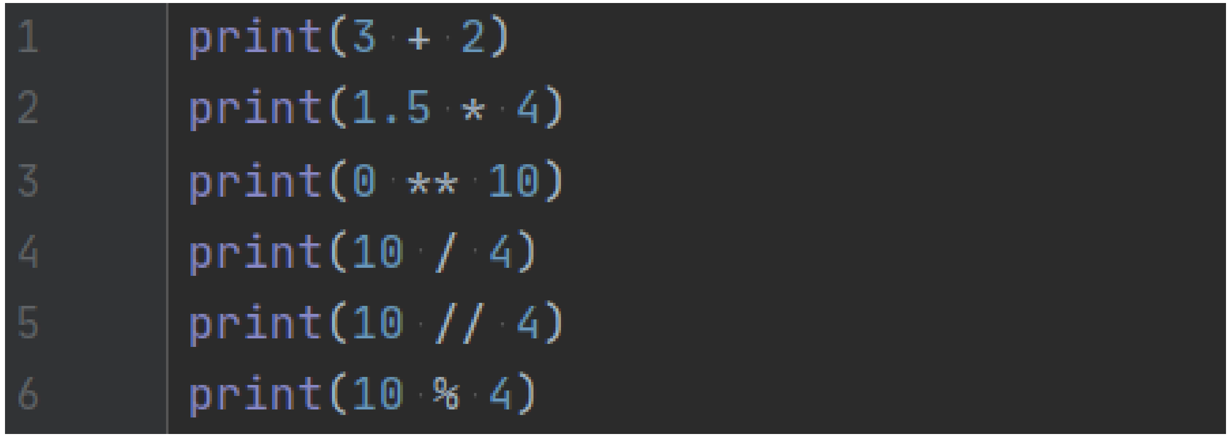
Data Types

- **Many kinds of data types are supported in Python**
  - Integer (int)
  - Float (float)
  - Boolean (bool)
  - String (str)
  - List / Tuple / Set (list, tuple, set)
  - Dictionary (dict)
  - Bytes (bytes)
  - Complex (complex)
  - …

Numeric Types

- **Integer, float and complex are numeric type data**

- **Basic arithmetic operations are supported (if valid)**

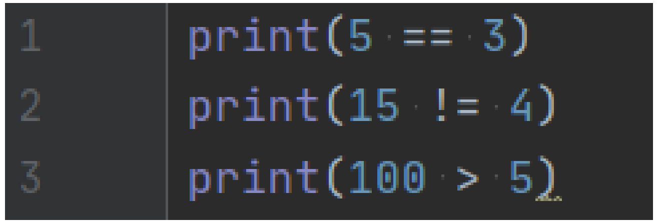


```
print(3 + 2)
print(1.5 * 4)
print(0 ** 10)
print(10 / 4)
print(10 // 4)
print(10 % 4)
```

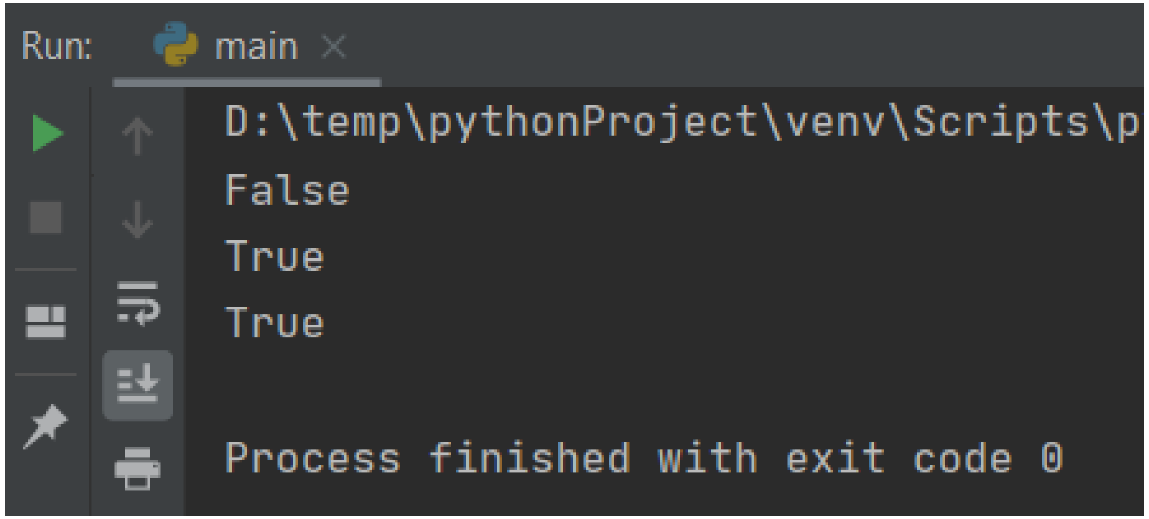
Boolean

- **Basically, boolean type can have two types of value**
  - True: Equivalent to non-zero number
  - False: Equivalent to zero

- **The result of comparison expression is Boolean**



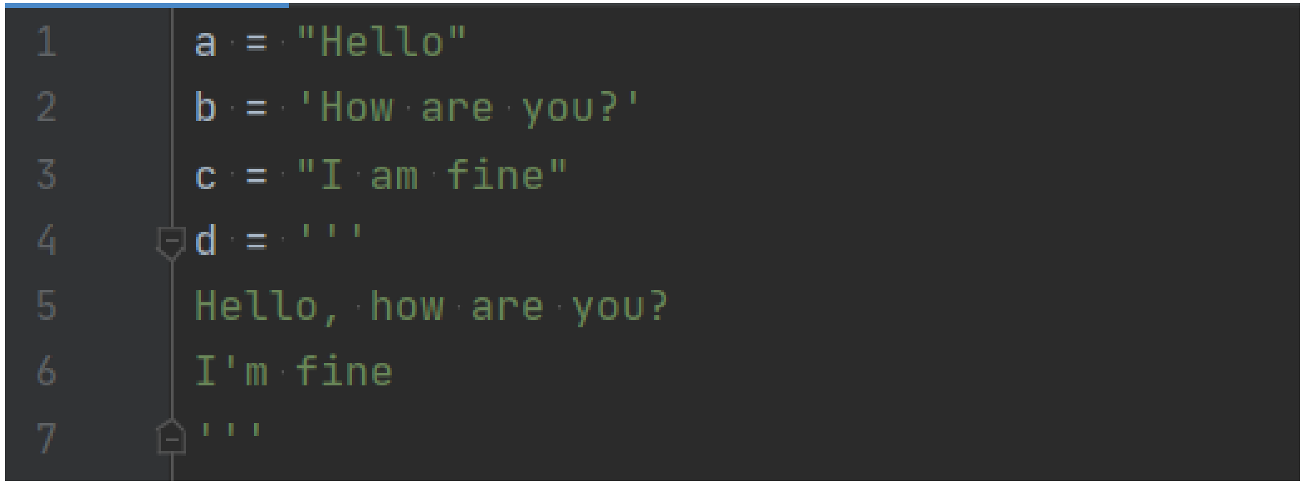
```python
print(5 == 3)
print(15 != 4)
print(100 > 5)
```



```
D:\temp\pythonProject\venv\Scripts\p
False
True
True

Process finished with exit code 0
```

String [1]

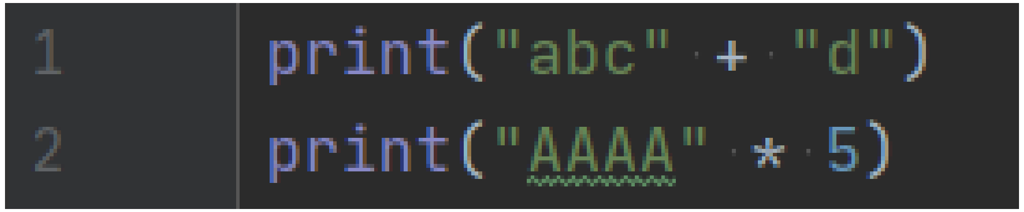
- **We can use ‘ ’, “ ”, or ‘” ‘” to represent string**
    - ‘” ‘” is for multiple-line string



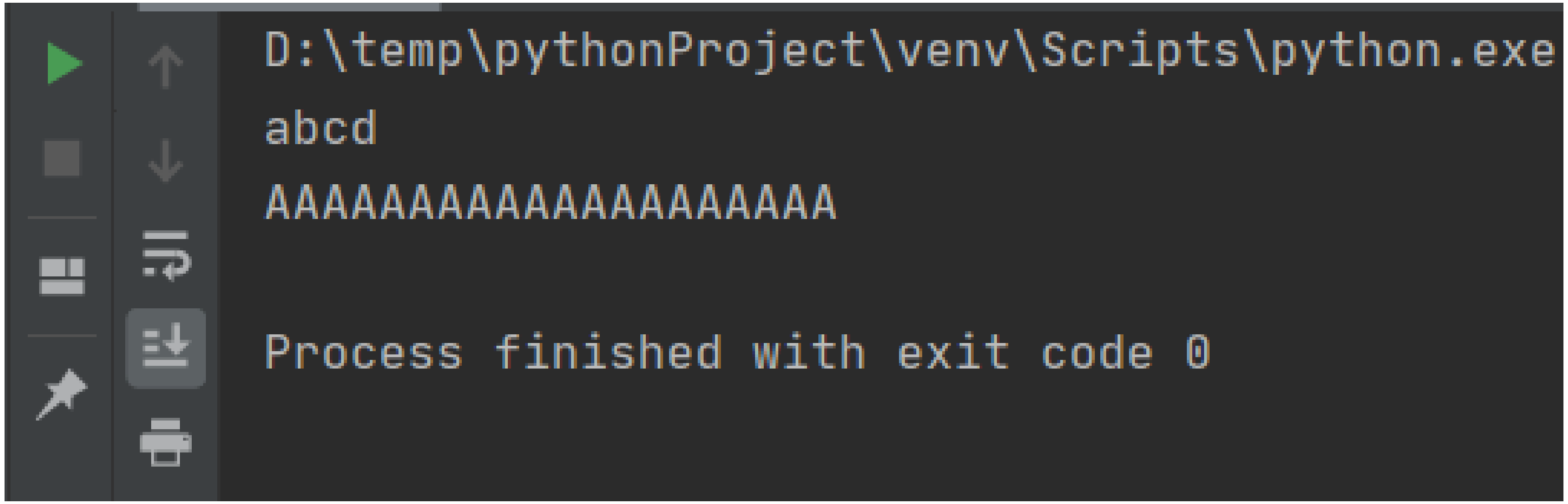
```python
a = "Hello"
b = 'How are you?'
c = "I am fine"
d = '''
Hello, how are you?
I'm fine
'''
```

String [2]

- **String can be added and repeated with + and ***



```python
print("abc" + "d")
print("AAAA" * 5)
```

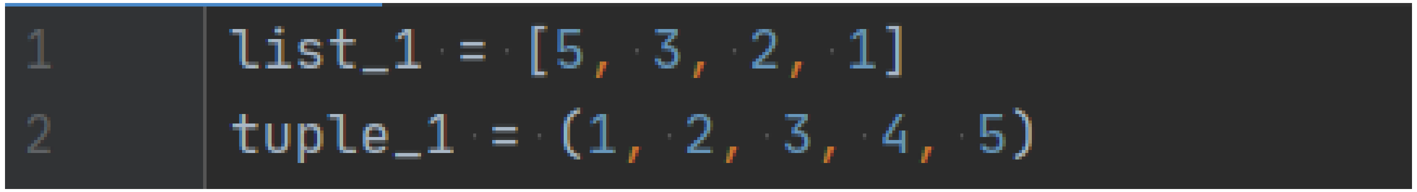


```
D:\temp\pythonProject\venv\Scripts\python.exe
abcd
AAAAAAAAAAAAAAAAAAAA

Process finished with exit code 0
```

List / Tuple [1]

- **List / tuple can contain multiple items**
  - Ex) (1, 2, 3, 4, 5), (“a”, “bc”, “def”)

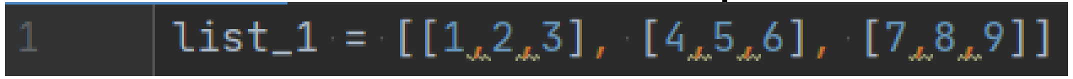
- **The only difference between these is:**
  - List uses [(item1), (item2), …] and **mutable**
  - Tuple uses ((item1), (item2), …) and **immutable**



```
list_1 = [5, 3, 2, 1]
tuple_1 = (1, 2, 3, 4, 5)
```

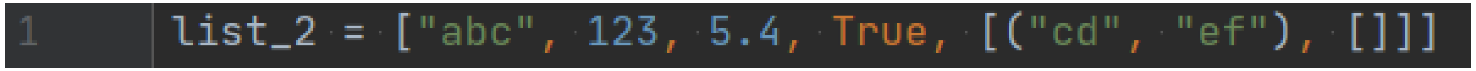
List / Tuple [2]

- **They can have any type of item**
  - Even if the item is list/tuple! (nested)



```python
list_1 = [[1,2,3], [4,5,6], [7,8,9]]
```

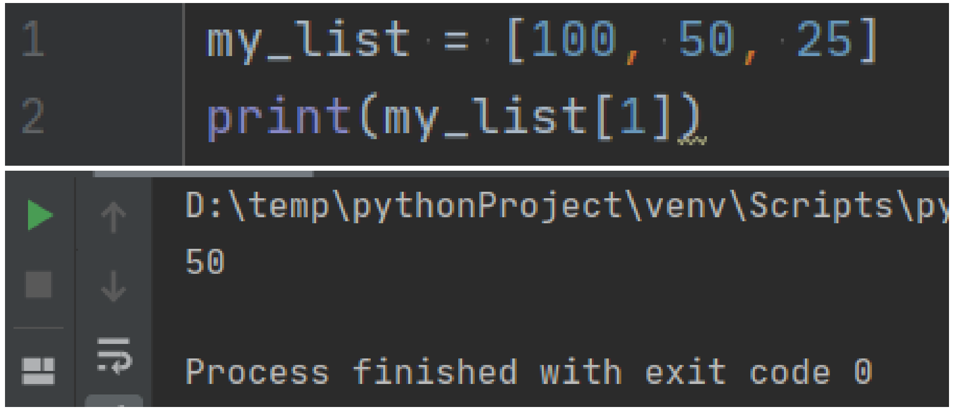
  - A list/tuple can have different kinds of items:



```python
list_2 = ["abc", 123, 5.4, True, [("cd", "ef"), []]]
```

List / Tuple [3]

- **We can get i-th item from list / tuple (indexing)**



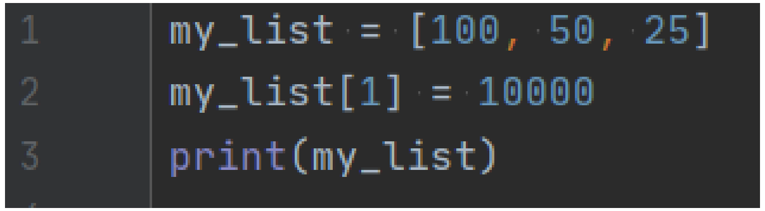
```python
my_list = [100, 50, 25]
print(my_list[1])
```

```
D:\temp\pythonProject\venv\Scripts\py
50

Process finished with exit code 0
```

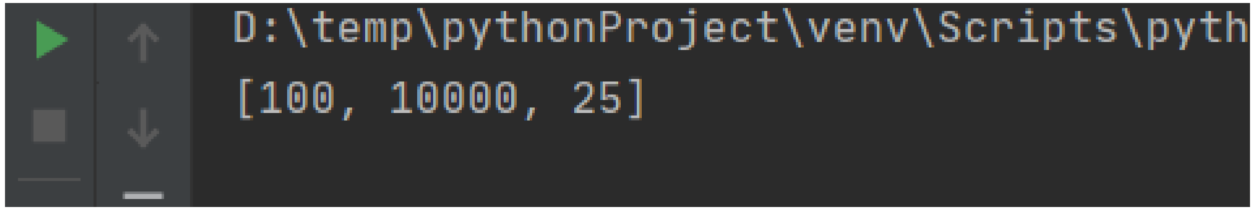
- **Note that the index starts at 0, not 1.**

List / Tuple [4]

- **We can modify the item of list (not tuple)**



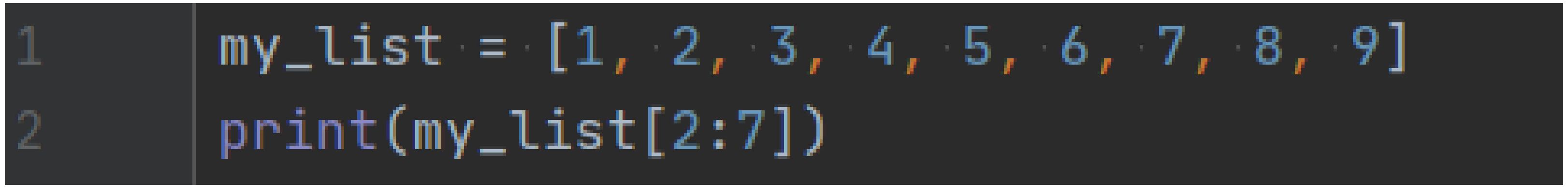
```
my_list = [100, 50, 25]
my_list[1] = 10000
print(my_list)
```



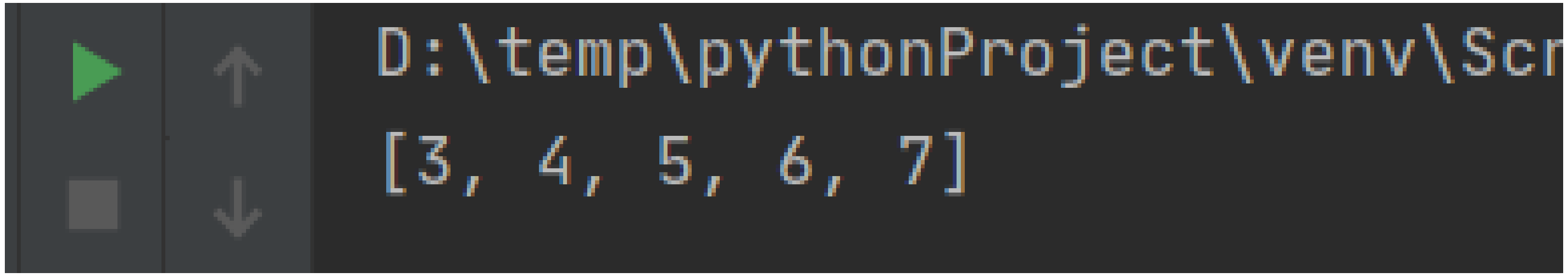
```
D:\temp\pythonProject\venv\Scripts\pyth
[100, 10000, 25]
```

List / Tuple [5]

- **We can index multiple items (slicing)**



```
my_list = [1, 2, 3, 4, 5, 6, 7, 8, 9]
print(my_list[2:7])
```



```
D:\temp\pythonProject\venv\Scr
[3, 4, 5, 6, 7]
```

- **Note that `my_list[7]` was not included**

Notes

- **Detailed explanation is in supporting material**

- **It is important to try and practice yourself!**

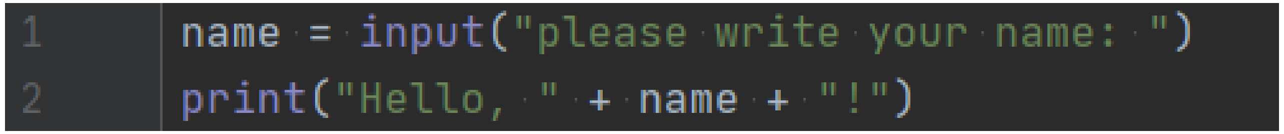
Some Important Functions

- **Before we learn about function, we should know some of important functions**
    - `print()`: already covered
    - `input()`: get the input from user (in console)
    - `int(), str(), list()`, …: change the type
    - `len()`: get the length of list, tuple, string, etc.
    - …

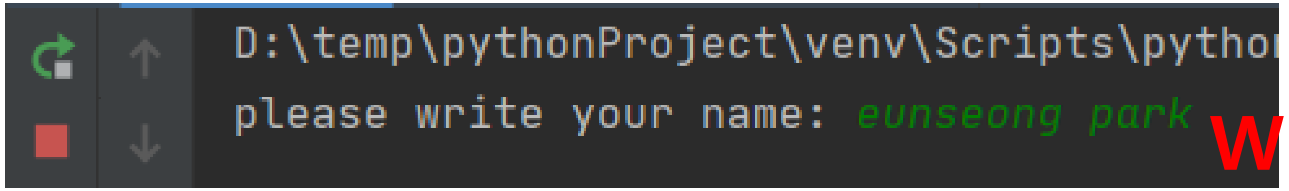
input()

- **We can get the input from user**

- **Basic use: input((message))**
  - Message can be omitted

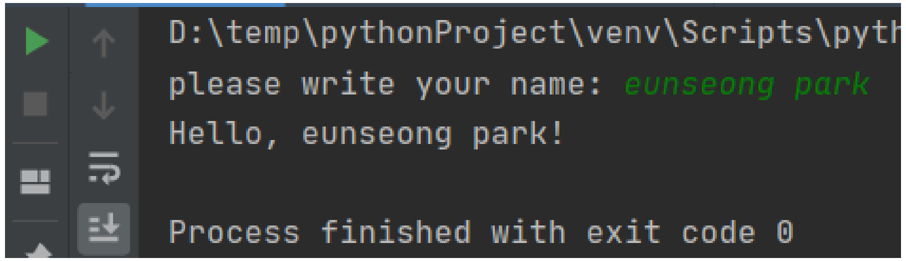


```python
name = input("please write your name: ")
print("Hello, " + name + "!")
```



```
D:\temp\pythonProject\venv\Scripts\pytho
please write your name: eunseong park
```

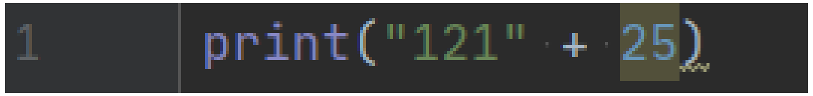
Write and then enter!



```
D:\temp\pythonProject\venv\Scripts\pyth
please write your name: eunseong park
Hello, eunseong park!

Process finished with exit code 0
```

int(), str(), list(), …

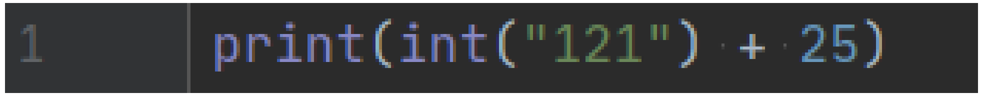
- **If possible, we can change the type of value / variable**
  - For example, we may want to take “121” as an integer, but it is string…



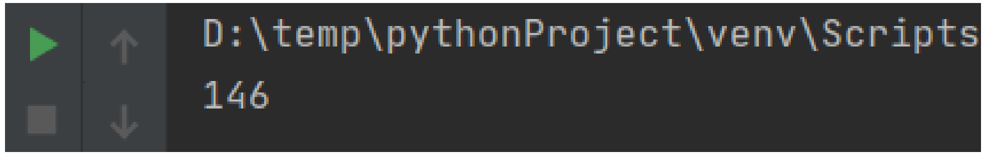
```
print("121" + 25)
```

  - This may cause an error

- **`int()` function can be remedy in this situation**



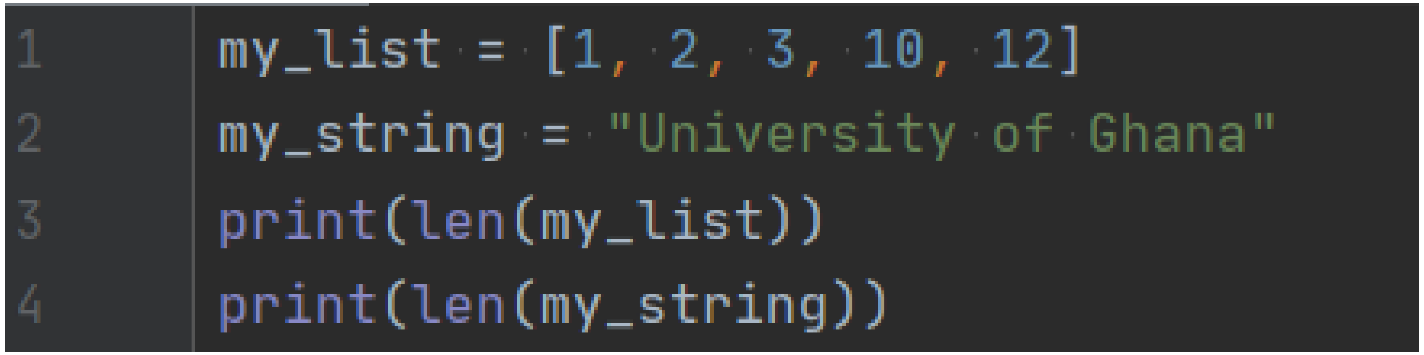
```
print(int("121") + 25)
```



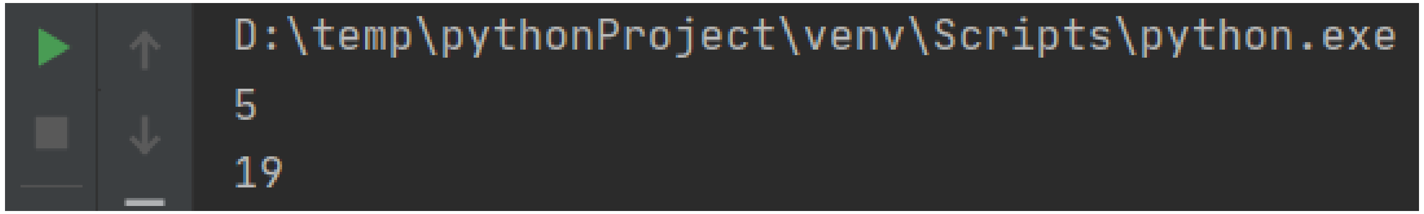
```
D:\temp\pythonProject\venv\Scripts
146
```

len()

- We may want to know the "length" of list or string

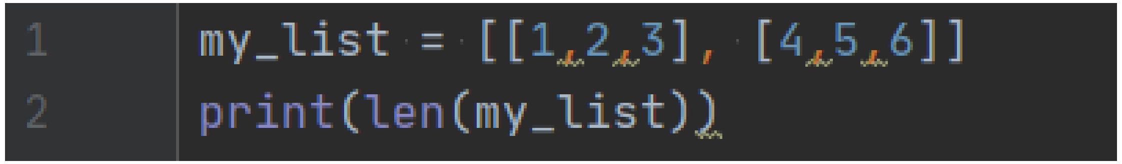


```python
my_list = [1, 2, 3, 10, 12]
my_string = "University of Ghana"
print(len(my_list))
print(len(my_string))
```



```
D:\temp\pythonProject\venv\Scripts\python.exe
5
19
```

- How about this?

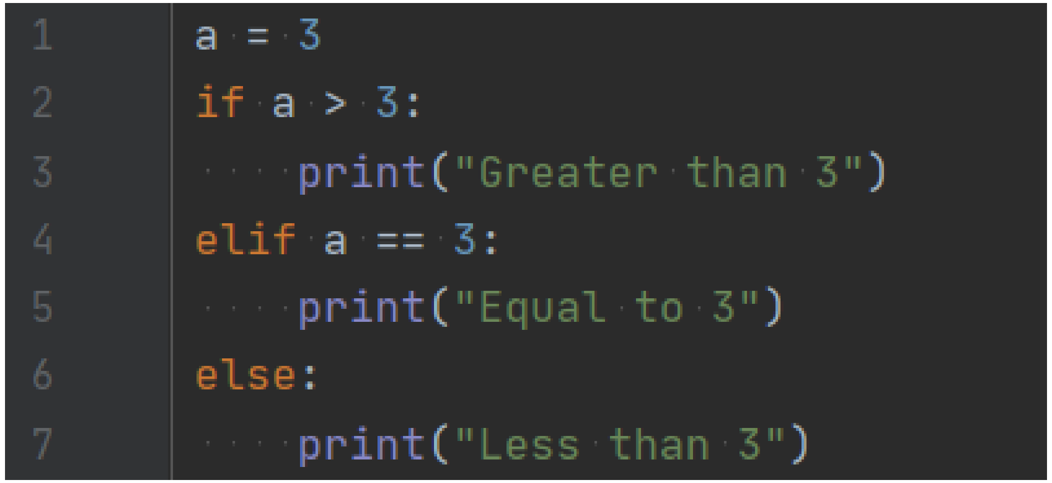


```python
my_list = [[1,2,3], [4,5,6]]
print(len(my_list))
```

Conditionals: `if`

- **We can execute different code according to the condition**

```
if (condition1):
        (code_1)
elif (codition2):
        (code_2)
elif (condition3):
        (code_3)
...
else:
        (code_else)
```

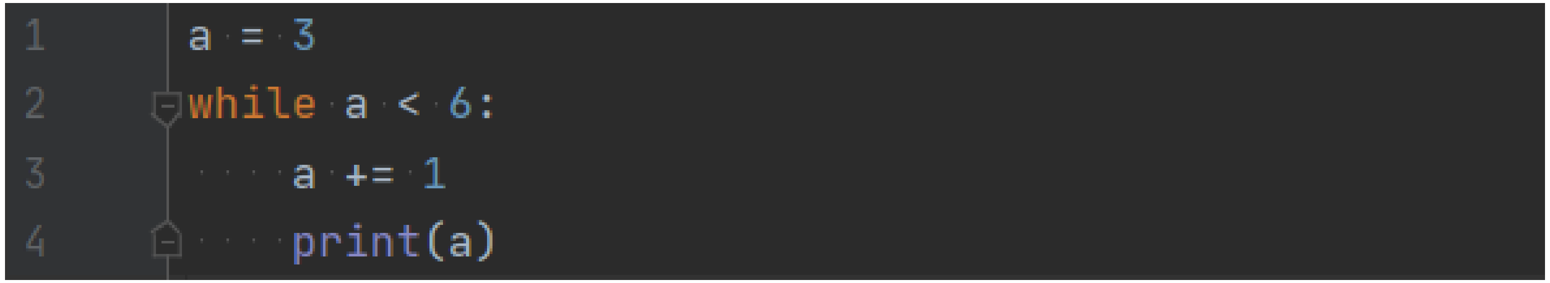


```python
a = 3
if a > 3:
    print("Greater than 3")
elif a == 3:
    print("Equal to 3")
else:
    print("Less than 3")
```

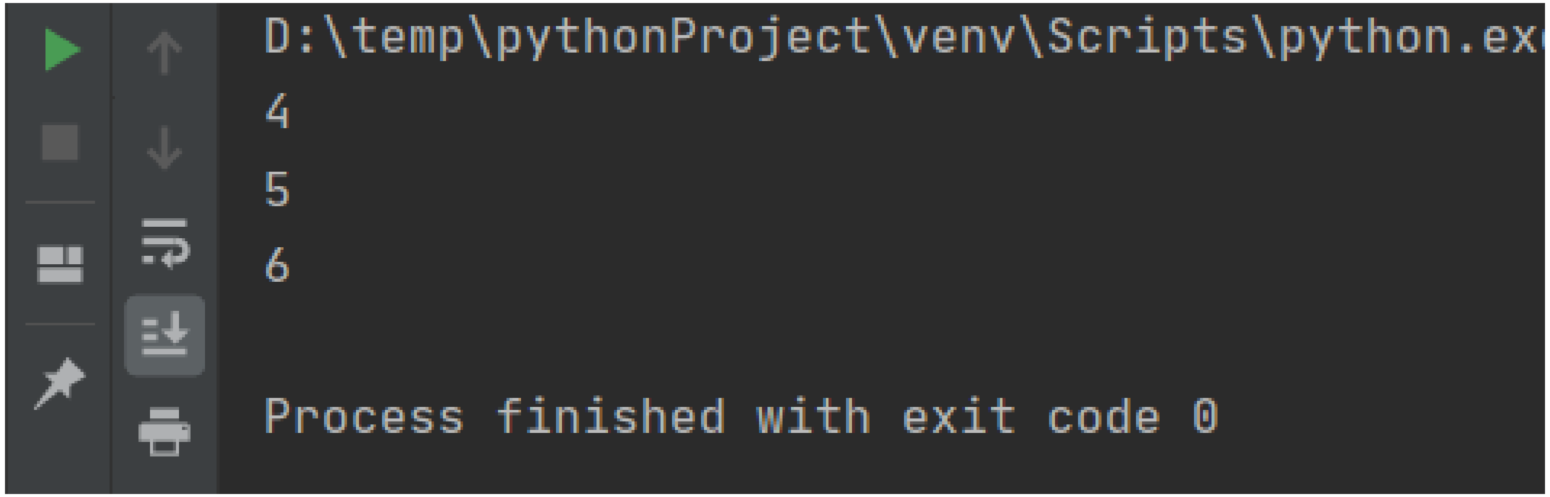
Loops: while

- We can repeat some work, by while and for statement

```
while (condition):
    (code)
```



```
a = 3
while a < 6:
    a += 1
    print(a)
```



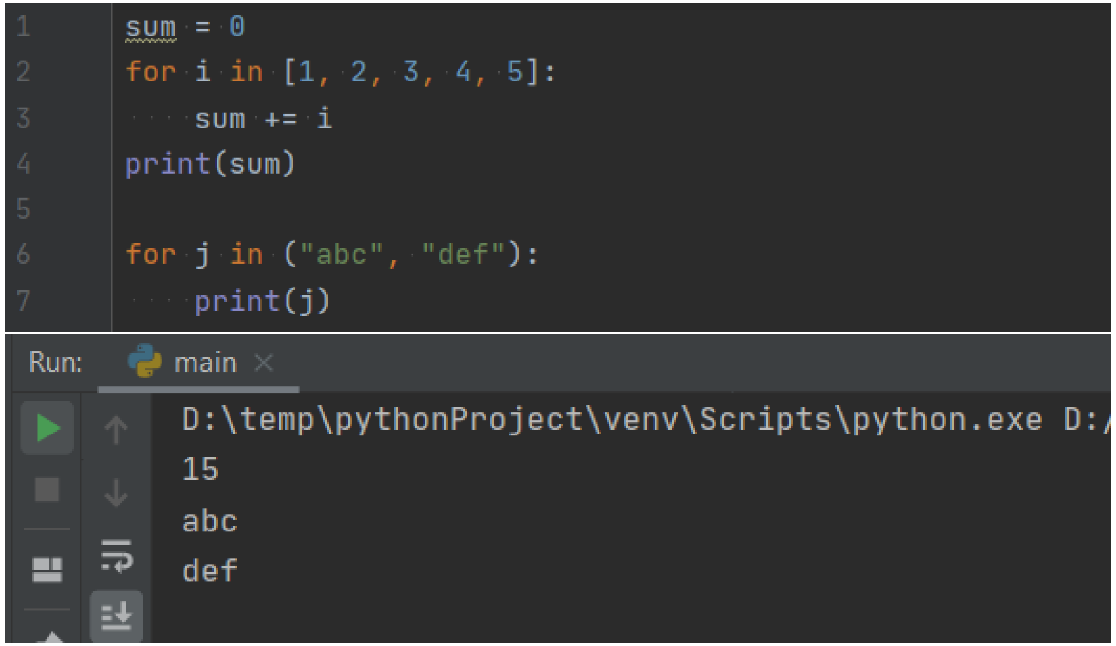
```
D:\temp\pythonProject\venv\Scripts\python.ex
4
5
6

Process finished with exit code 0
```

Loops: for [1]

- **In for statement, an “iterator” traverses given list-like object**
  - Iterator is a (usually) temporary variable
  - The list-like object is called “iterable” object

for (iterator) in (iterable):

(code)



```python
sum = 0
for i in [1, 2, 3, 4, 5]:
    sum += i
print(sum)

for j in ("abc", "def"):
    print(j)
```

```
D:\temp\pythonProject\venv\Scripts\python.exe D:/
15
abc
def
```

Loops: for [2]

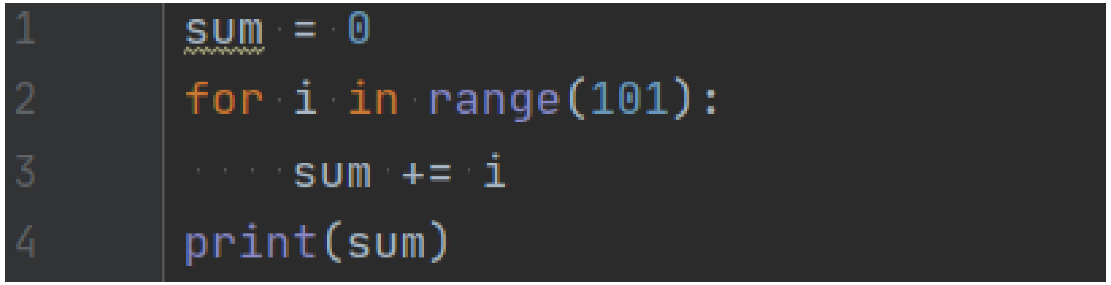
- **range() function provides a sequence of number**
  - It is useful for using for statement
  - It gives “range” type, it is also iterable (list-like)

range(start:end:step)

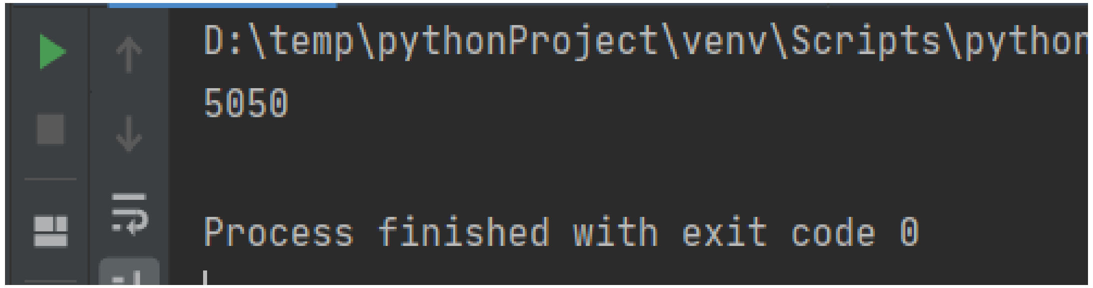
Starting number
(can be omitted)

Ending number
The number, end is not included in the result

step
(can be omitted)



```
sum = 0
for i in range(101):
    sum += i
print(sum)
```



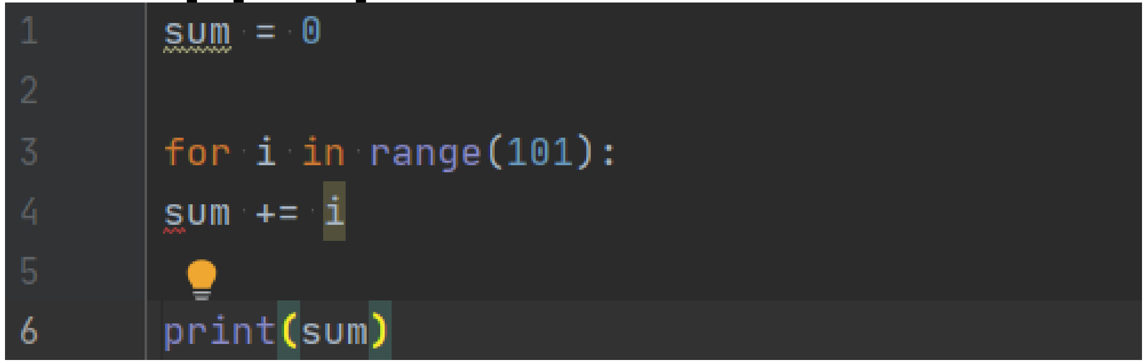
```
D:\temp\pythonProject\venv\Scripts\python
5050

Process finished with exit code 0
```

Indentation

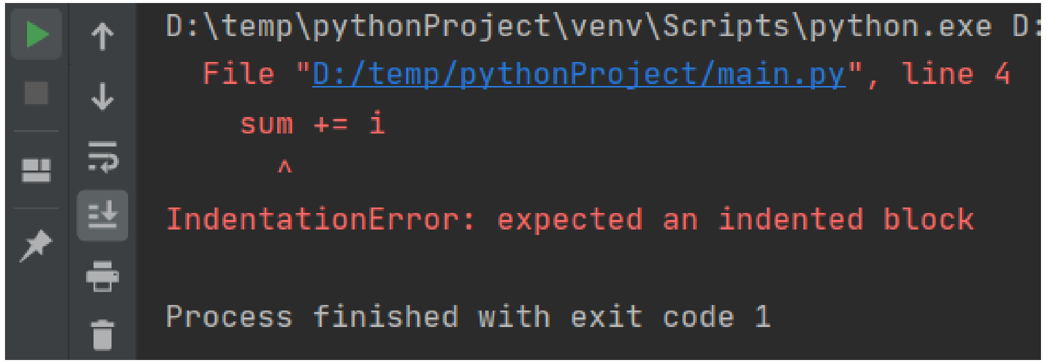
- It matters in Python, unlike other programming languages

- Usually, indent after some statement with “:”
  - `If (condition): / while (condition): / for i in (iterable):`

- Inappropriate indentation can cause an error



```
1  sum = 0
2
3  for i in range(101):
4  sum += i
5
6  print(sum)
```



```
D:\temp\pythonProject\venv\Scripts\python.exe D:
  File "D:/temp/pythonProject/main.py", line 4
    sum += i
      ^
IndentationError: expected an indented block

Process finished with exit code 1
```

Exercises

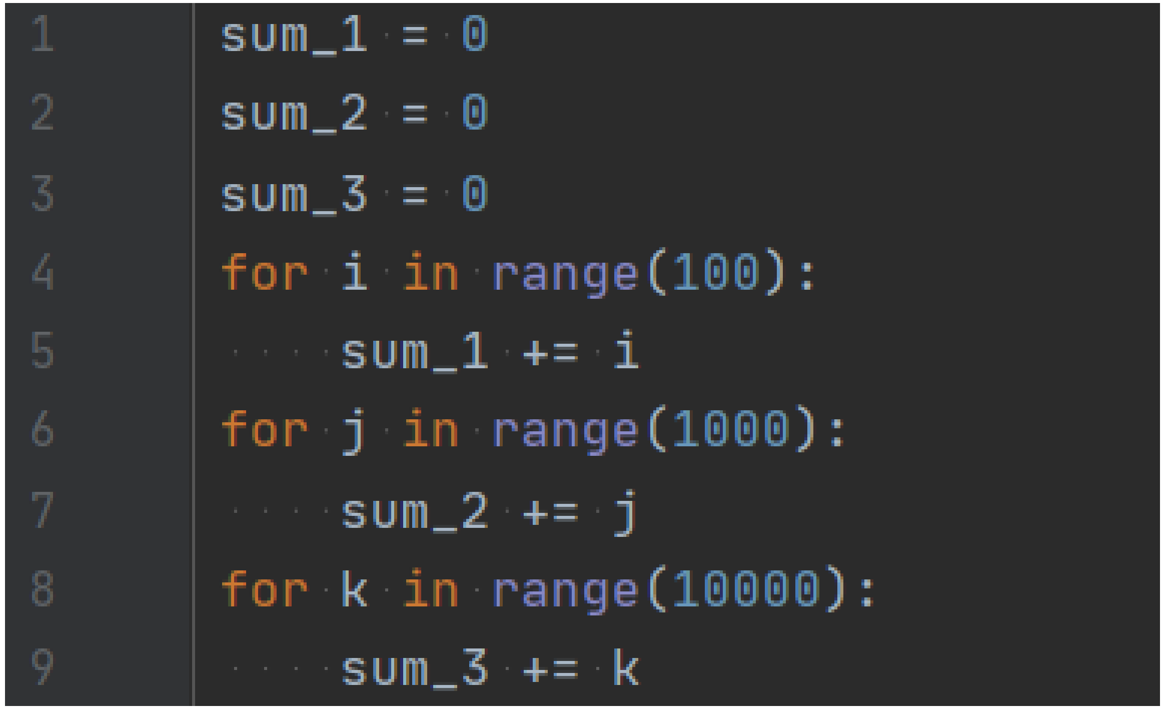
- Some exercises for you are in “exercises”

Functions in Programming

- **Functions in programming is slightly different with that in math**
  - Function in math just give some value
    - For example, in f(x) = 2x, f(10) gives 20.
    - Just calculation, no side-effects
  - Function in programming is a code sequence that does some work
    - We can give some value like the function in math
      - The value is called "return value"
    - We can make some side-effects, other than just calculation
      - Print out some message
      - Change some variable
      - Cause an error

Why Do We Use Function?

- We can avoid repetitive task and code
- It makes maintenance easier
- Reusability
- So on…

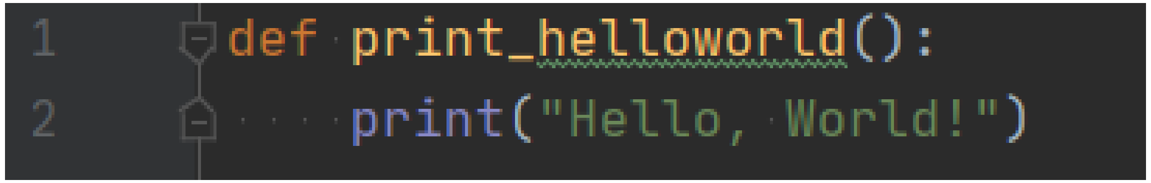


```python
sum_1 = 0
sum_2 = 0
sum_3 = 0
for i in range(100):
    sum_1 += i
for j in range(1000):
    sum_2 += j
for k in range(10000):
    sum_3 += k
```

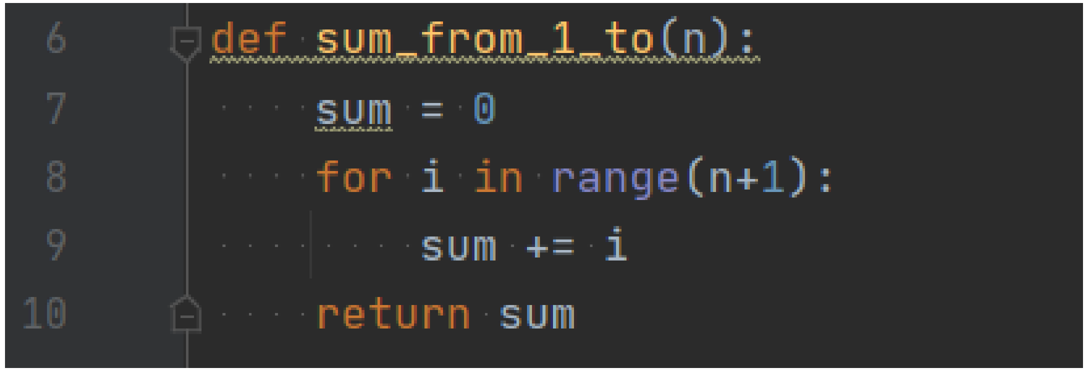
Defining Function [1]

- We use def keyword

```
def function_name(parameter):
    (body)
```



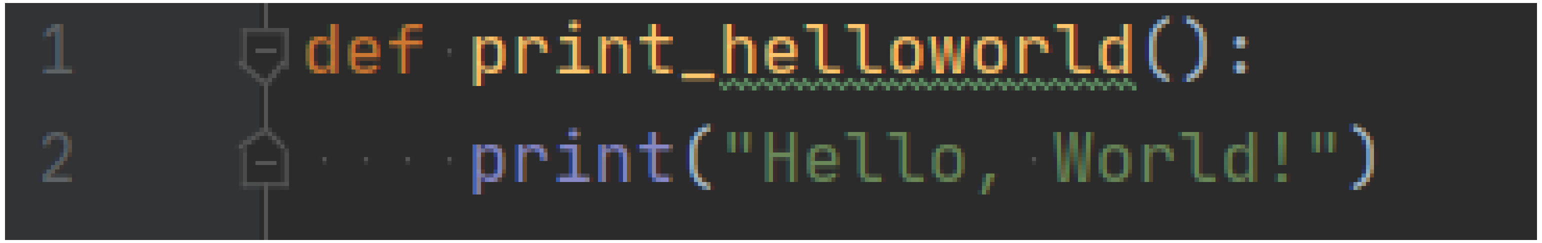
```python
def print_helloworld():
    print("Hello, World!")
```



```python
def sum_from_1_to(n):
    sum = 0
    for i in range(n+1):
        sum += i
    return sum
```

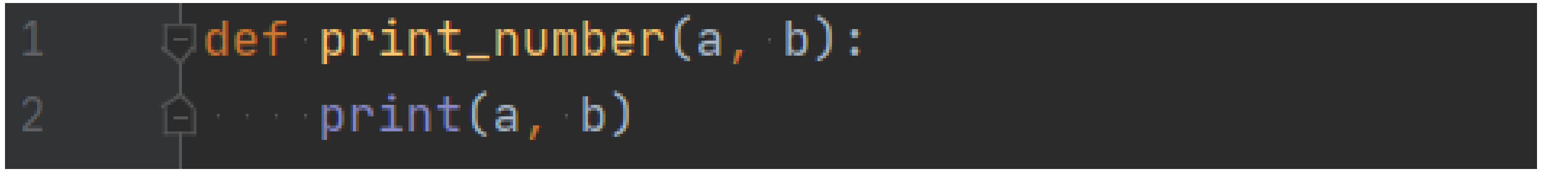
Defining Function [2]

- Some function may not have parameter



```python
def print_helloworld():
    print("Hello, World!")
```

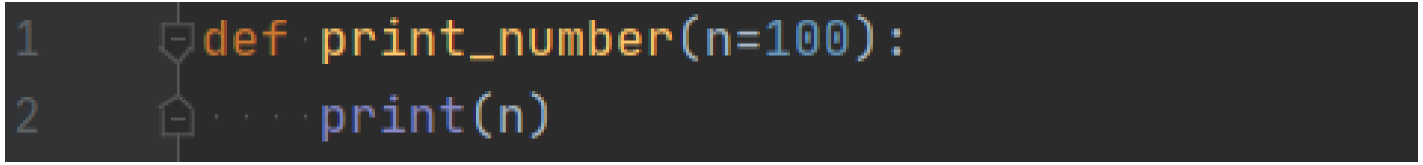
- Some function may have two or more parameters



```python
def print_number(a, b):
    print(a, b)
```

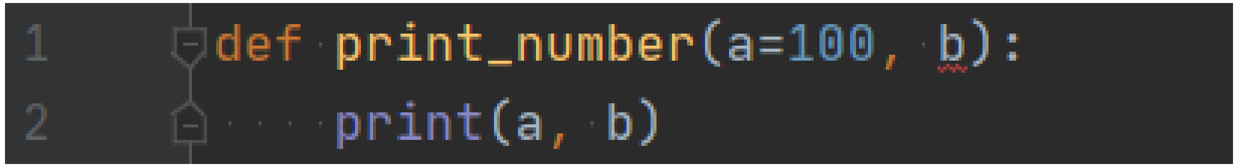
Defining Function [3]

- **We can set a default argument**
  - we omit the argument, then default value is used



```
def print_number(n=100):
    print(n)
```

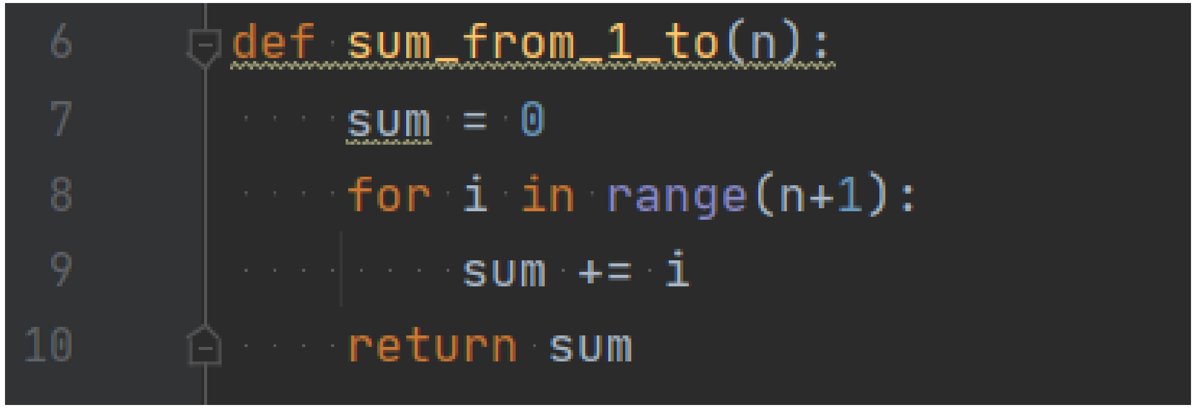
- **Note that non-default one must precede default one!**
  - This causes an error



```
def print_number(a=100, b):
    print(a, b)
```

Defining Function [4]

- **return keyword determines a return value of the function**
  - When we return, the function is terminated, immediately

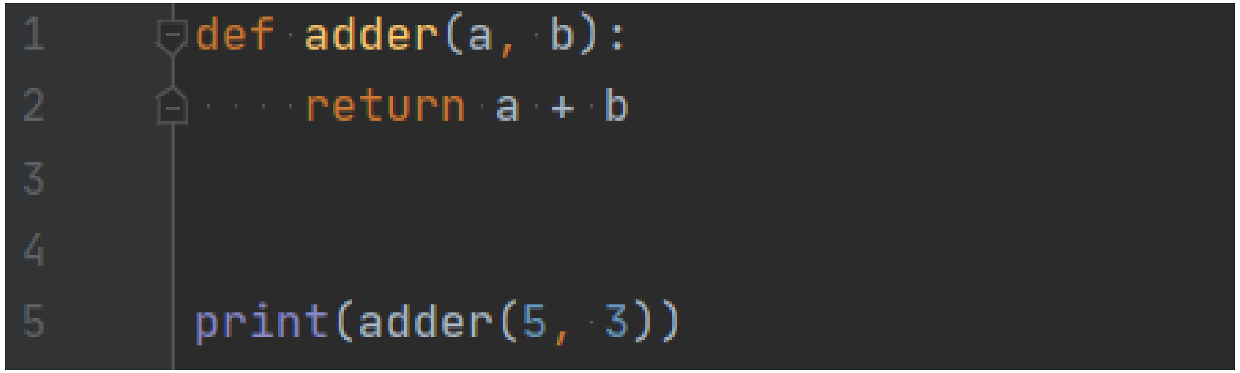


```python
def sum_from_1_to(n):
    sum = 0
    for i in range(n+1):
        sum += i
    return sum
```

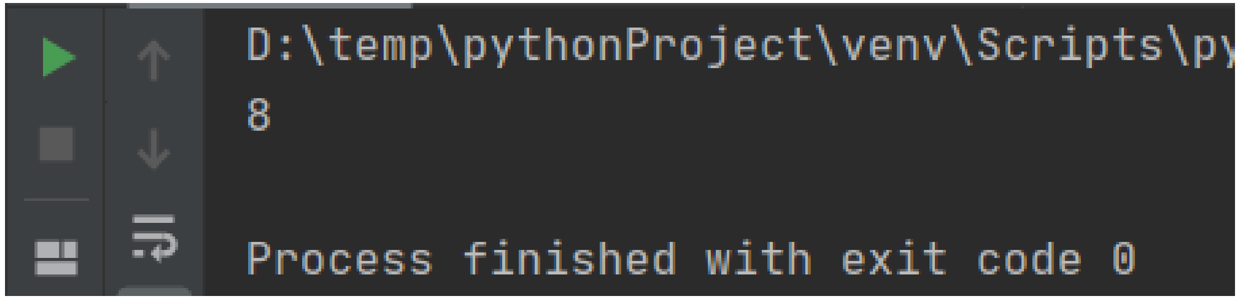
- **Some function may not have a return value**

Using Function [1]

- **We can call some function with `(FunctionName)(parameters)`**



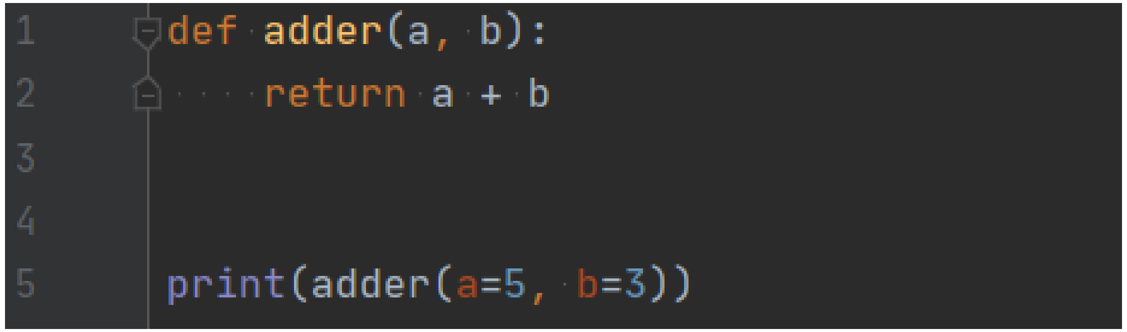
```python
def adder(a, b):
    return a + b


print(adder(5, 3))
```



```
D:\temp\pythonProject\venv\Scripts\py
8

Process finished with exit code 0
```

Using Function [2]

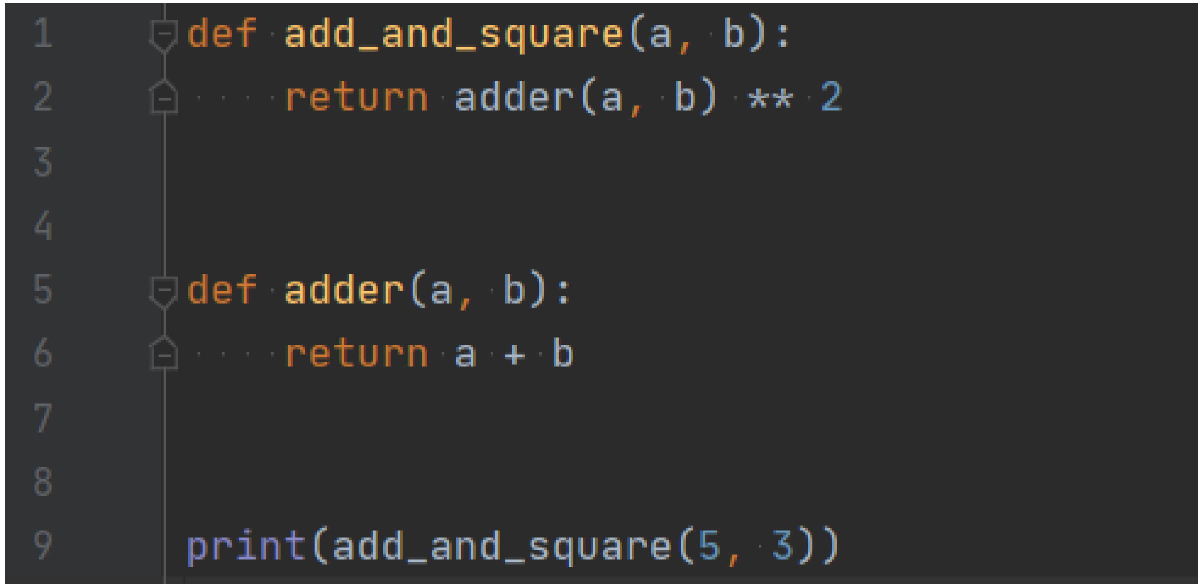
- **We can indicate the parameter explicitly (if needed)**



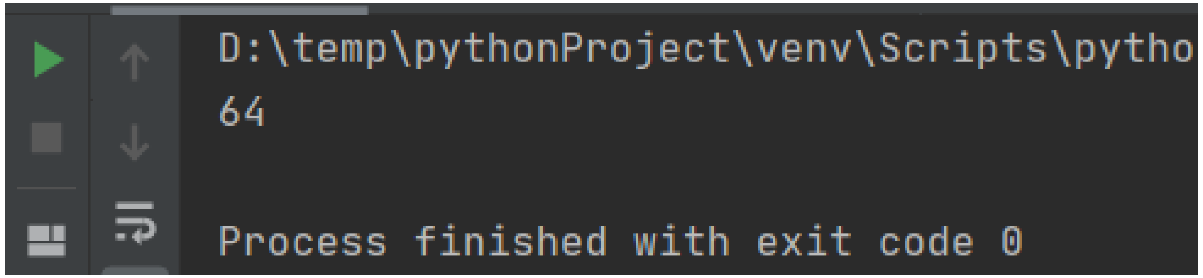
```python
def adder(a, b):
    return a + b


print(adder(a=5, b=3))
```

More about Function [1]

- A function can call another function



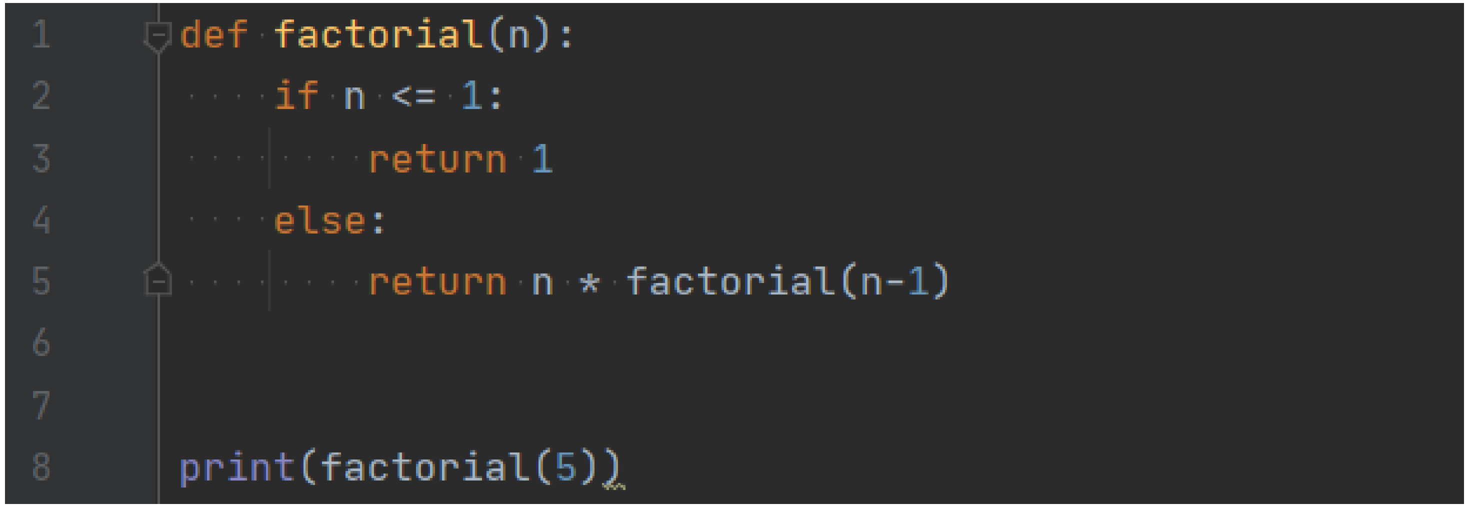
```python
def add_and_square(a, b):
    return adder(a, b) ** 2


def adder(a, b):
    return a + b


print(add_and_square(5, 3))
```



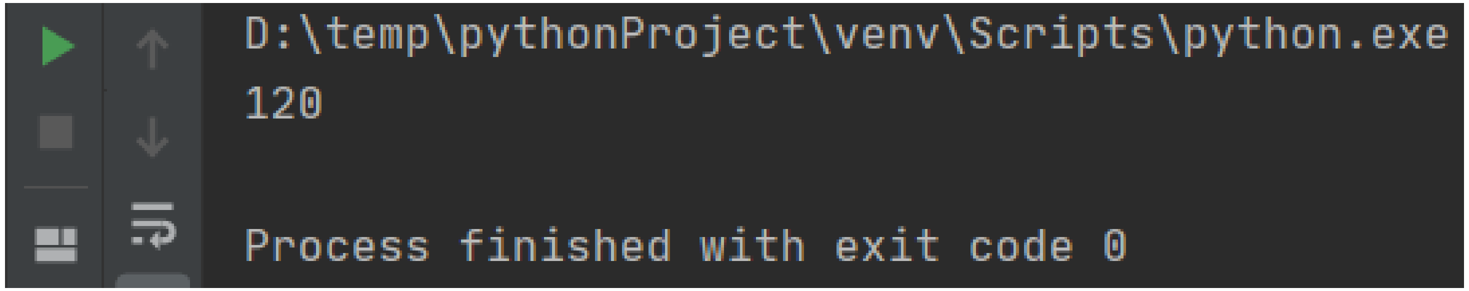
```
D:\temp\pythonProject\venv\Scripts\pytho
64

Process finished with exit code 0
```

More about Function [2]

- **Even it can call itself! (called "recursion")**



```python
def factorial(n):
    if n <= 1:
        return 1
    else:
        return n * factorial(n-1)


print(factorial(5))
```



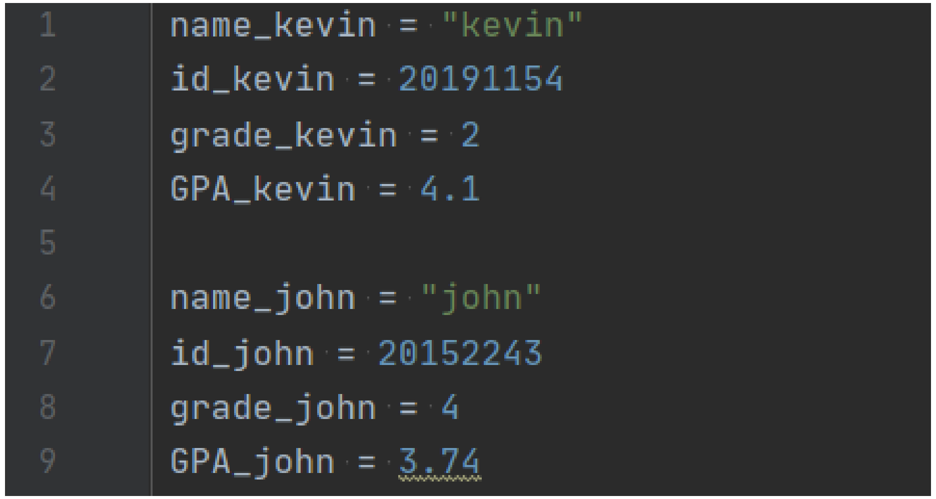
```
D:\temp\pythonProject\venv\Scripts\python.exe
120

Process finished with exit code 0
```

Exercises

- Some exercises for you are in “exercises”

Class: Motivation

- **How can we store / deal with each student's information?**
  - It includes name, ID, grade, GPA, etc.
  - …like this? What if there are 3~4000 students?



```
name_kevin = "kevin"
id_kevin = 20191154
grade_kevin = 2
GPA_kevin = 4.1

name_john = "john"
id_john = 20152243
grade_john = 4
GPA_john = 3.74
```

- **Is there any wiser way?**

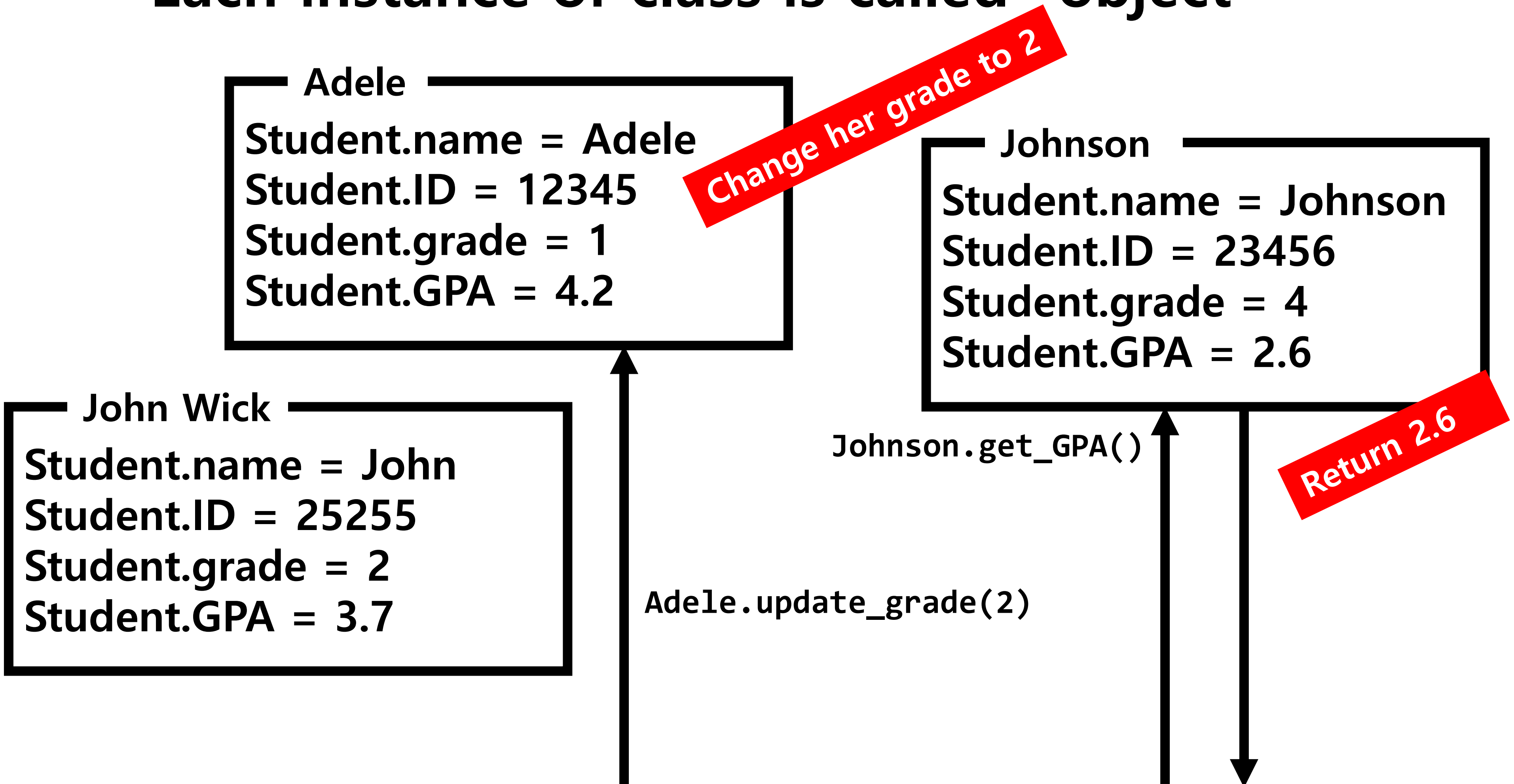
Class [1]

- **Class is a frame that contains:**
  - Several variables (member variable)
  - Several functions to deal with the data (method)

- **For example of student…**
  - Member variable: name, ID, grade, GPA, …
  - Methods: changing GPA, getting information, increasing grade, …

Class [2]

- Each instance of class is called "object"



Adele

Student.name = Adele
Student.ID = 12345
Student.grade = 1
Student.GPA = 4.2

Change her grade to 2

Johnson

Student.name = Johnson
Student.ID = 23456
Student.grade = 4
Student.GPA = 2.6

John Wick

Student.name = John
Student.ID = 25255
Student.grade = 2
Student.GPA = 3.7

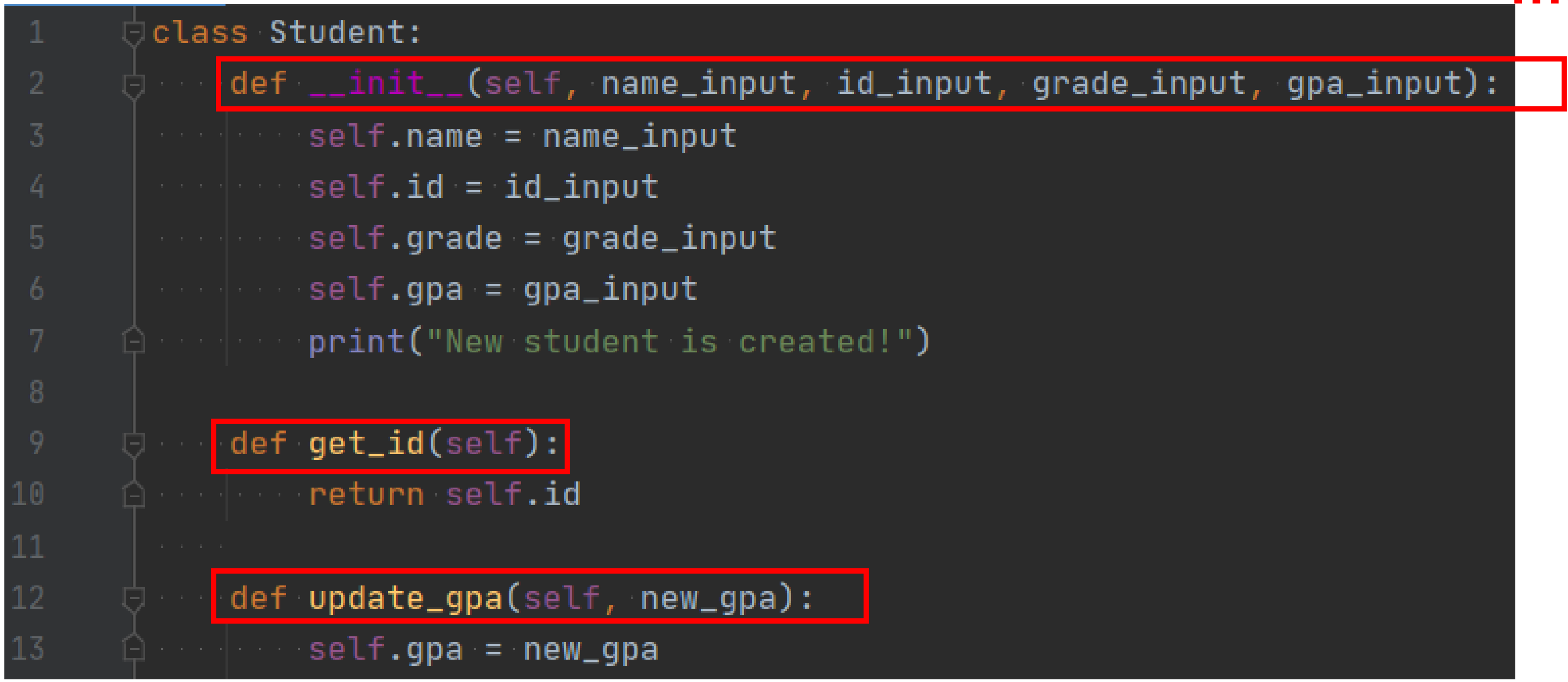
Johnson.get_GPA()

Return 2.6

Adele.update_grade(2)

Defining Class [1]

- **We can define a class with `class` keyword**

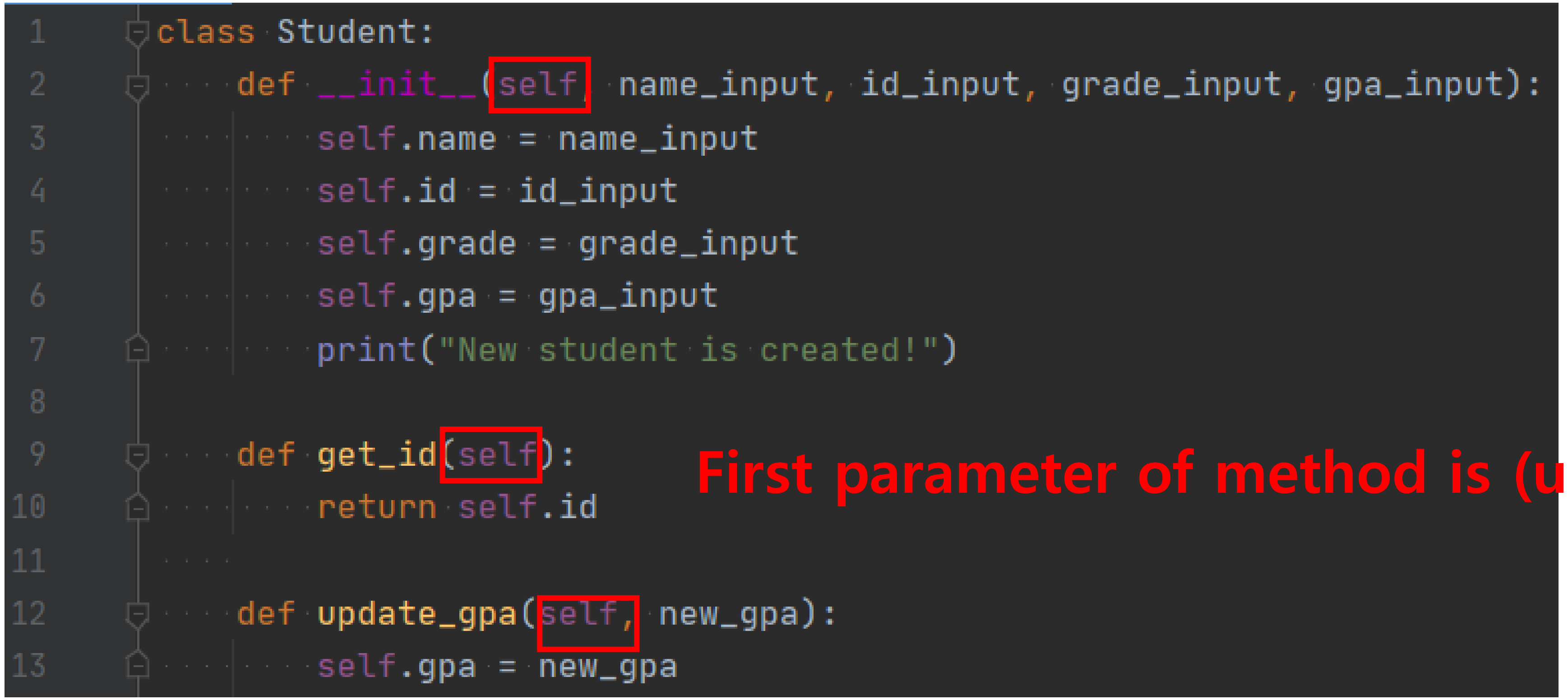


```python
class Student:
    def __init__(self, name_input, id_input, grade_input, gpa_input):
        self.name = name_input
        self.id = id_input
        self.grade = grade_input
        self.gpa = gpa_input
        print("New student is created!")

    def get_id(self):
        return self.id

    def update_gpa(self, new_gpa):
        self.gpa = new_gpa
```

methods

Defining Class [2]

- **We can define a class with `class` keyword**

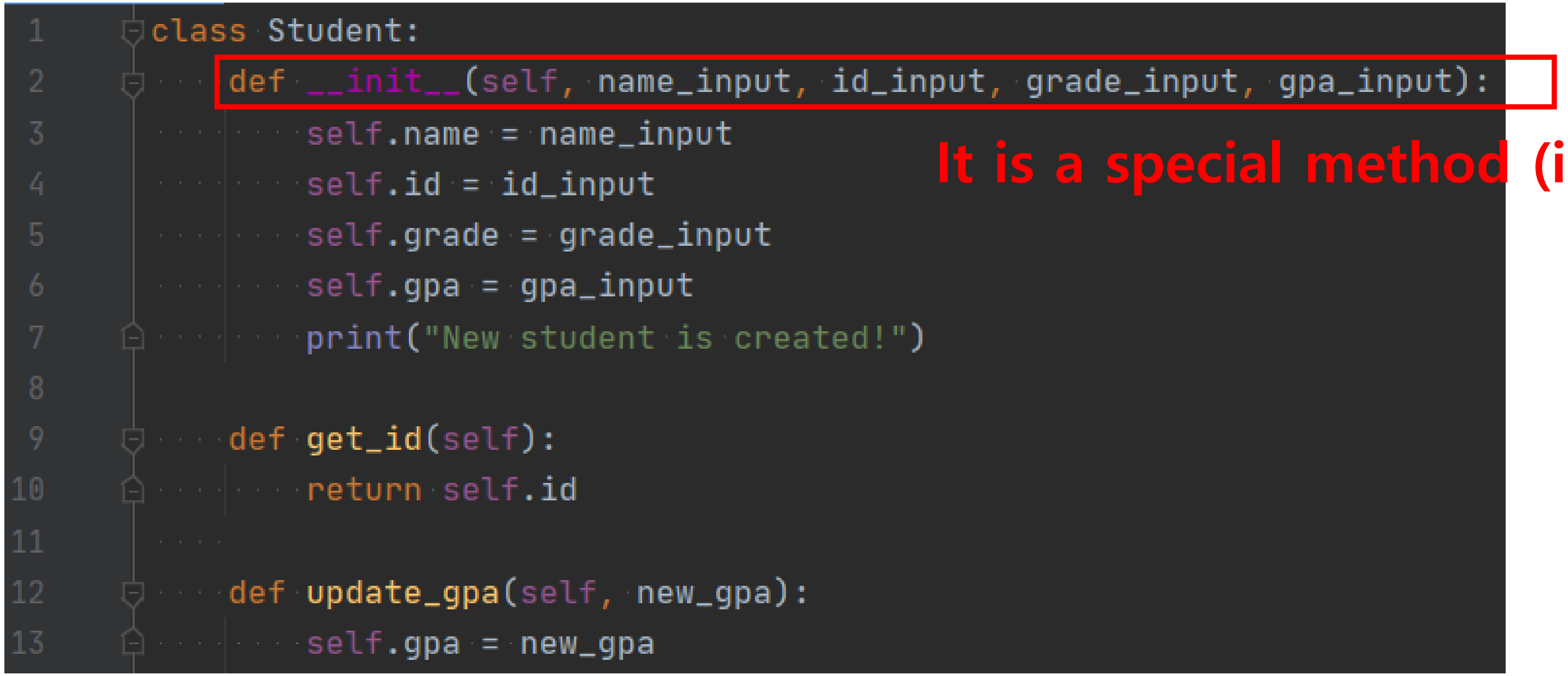


```python
class Student:
    def __init__(self, name_input, id_input, grade_input, gpa_input):
        self.name = name_input
        self.id = id_input
        self.grade = grade_input
        self.gpa = gpa_input
        print("New student is created!")

    def get_id(self):
        return self.id

    def update_gpa(self, new_gpa):
        self.gpa = new_gpa
```

First parameter of method is (usually) `self`

Defining Class [3]

- We can define a class with `class` keyword

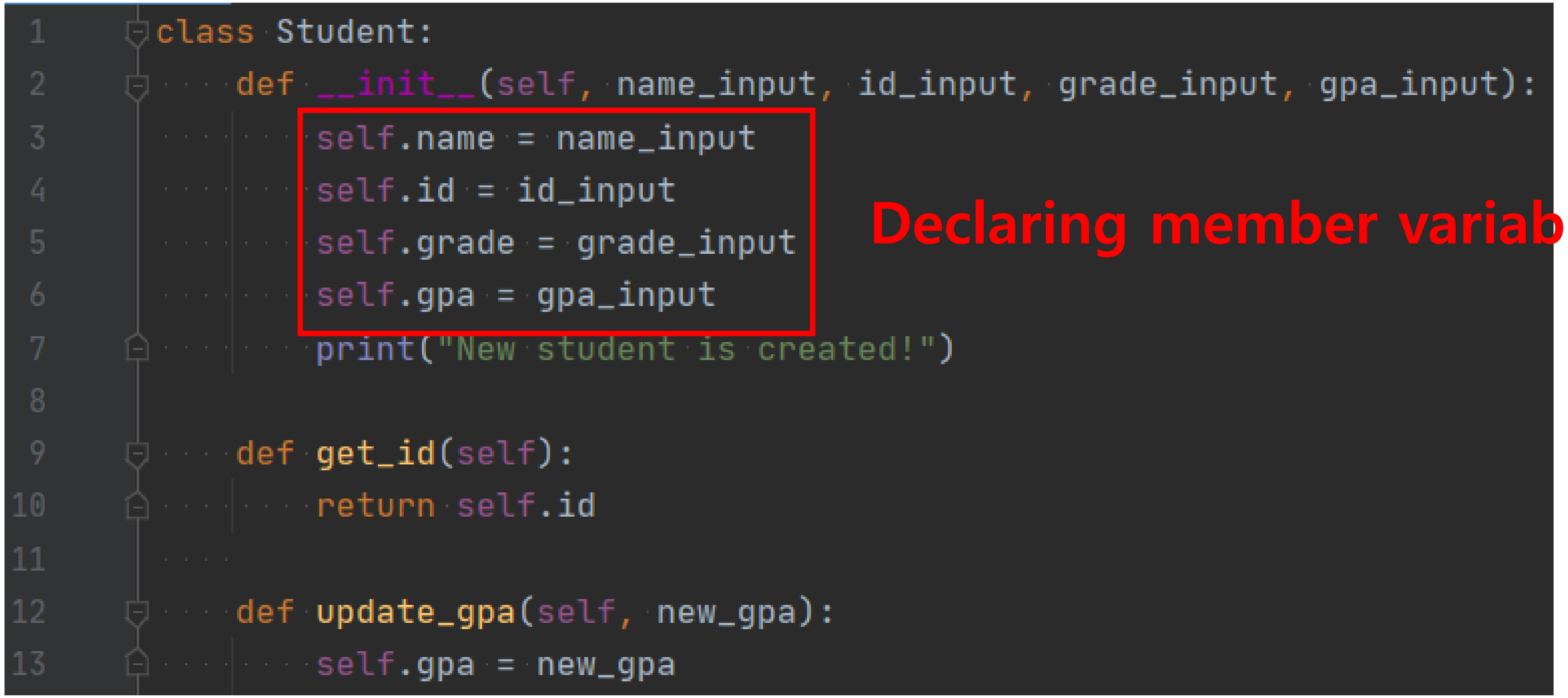


```python
class Student:
    def __init__(self, name_input, id_input, grade_input, gpa_input):
        self.name = name_input
        self.id = id_input
        self.grade = grade_input
        self.gpa = gpa_input
        print("New student is created!")

    def get_id(self):
        return self.id
    
    def update_gpa(self, new_gpa):
        self.gpa = new_gpa
```

It is a special method (initializer)

Defining Class [4]

- We can define a class with `class` keyword

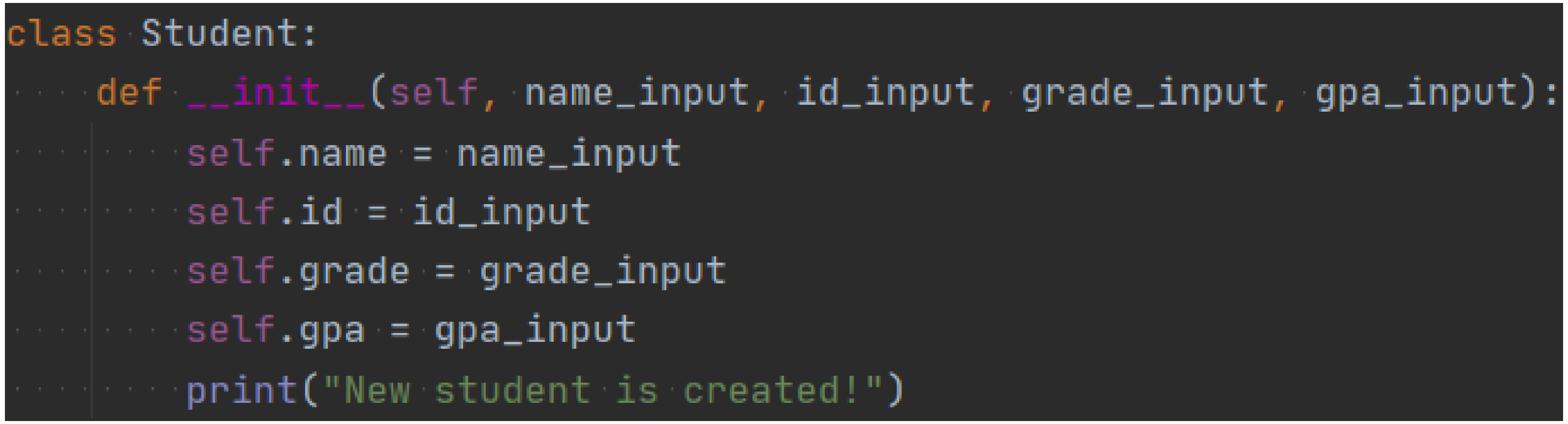


```python
class Student:
    def __init__(self, name_input, id_input, grade_input, gpa_input):
        self.name = name_input
        self.id = id_input
        self.grade = grade_input
        self.gpa = gpa_input
        print("New student is created!")

    def get_id(self):
        return self.id

    def update_gpa(self, new_gpa):
        self.gpa = new_gpa
```

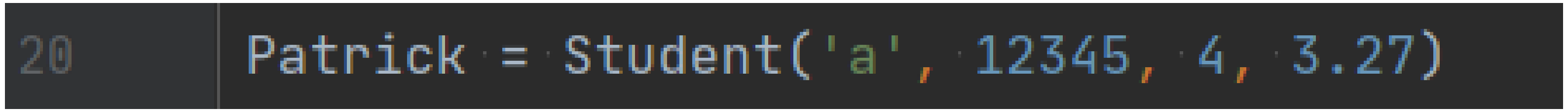
Declaring member variable

Using Object [1]

- **We can make an object with `(ClassName)(some arguments)`**
    - Use the parameter of `__init()__`



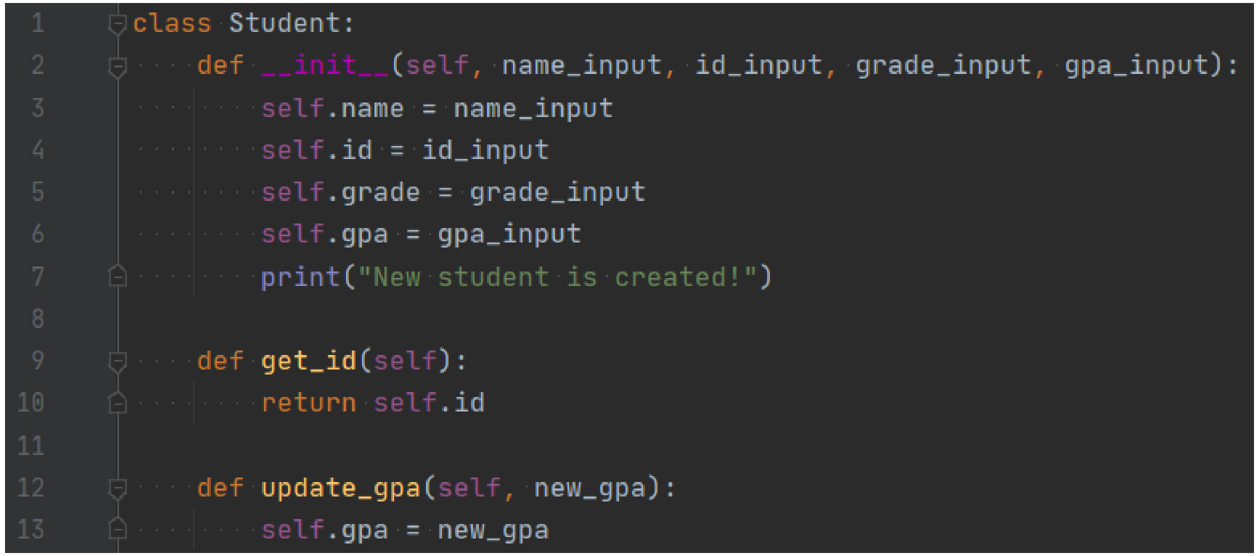
```python
class Student:
    def __init__(self, name_input, id_input, grade_input, gpa_input):
        self.name = name_input
        self.id = id_input
        self.grade = grade_input
        self.gpa = gpa_input
        print("New student is created!")
```



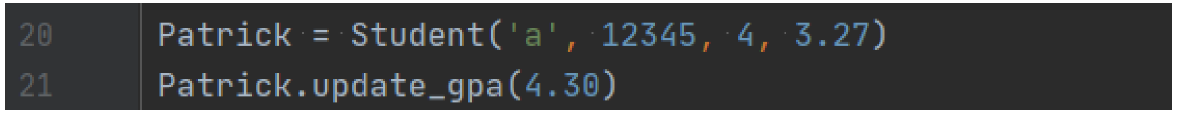
```python
Patrick = Student('a', 12345, 4, 3.27)
```

Using Object [2]

- **Call method with `(ObjectName).(MethodName)(param)`**
- **Note that (including `__init()__`) we omit the argument for `self`**



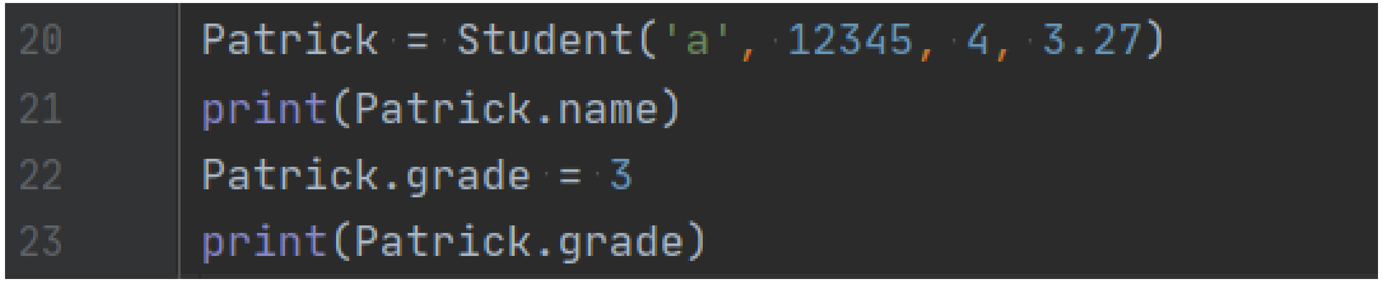
```python
class Student:
    def __init__(self, name_input, id_input, grade_input, gpa_input):
        self.name = name_input
        self.id = id_input
        self.grade = grade_input
        self.gpa = gpa_input
        print("New student is created!")

    def get_id(self):
        return self.id

    def update_gpa(self, new_gpa):
        self.gpa = new_gpa
```



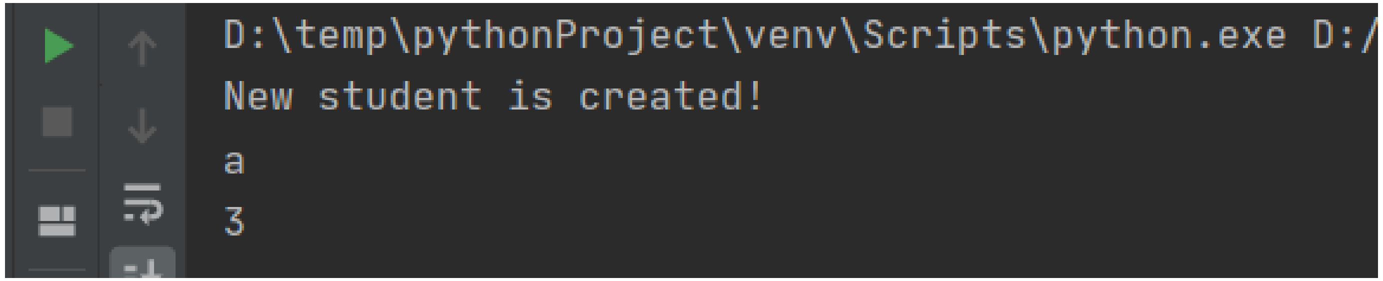
```python
Patrick = Student('a', 12345, 4, 3.27)
Patrick.update_gpa(4.30)
```

Using Object [3]

- **We can directly access to member variables**
  - With `(ObjectName).(VarName)`



```python
Patrick = Student('a', 12345, 4, 3.27)
print(Patrick.name)
Patrick.grade = 3
print(Patrick.grade)
```



```
D:\temp\pythonProject\venv\Scripts\python.exe D:/
New student is created!
a
3
```

  - Of course, if this is public…

Exercises

- Some exercises for you are in “exercises”

Libraries

- **To put it simply, library is a collection of data, function, and classes.**

- **There are many of libraries for many purposes**
  - For math
  - For statistics
  - For image processing
  - For AI, ML
  - For game
  - …There’s almost everything we want

Libraries: Motivation [1]

- **Why we need libraries?**

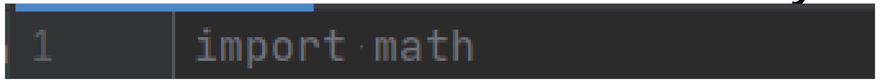
Libraries: Motivation [2]

- **Why we need libraries?**

- **Because our time is precious!!**
  - We don’t need to implement everything
  - Just use functions made by professional developers!

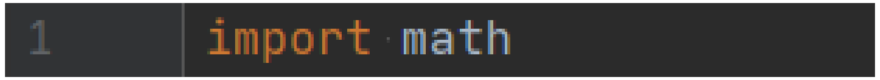
Using Library: math [1]

- **Use `import` keyword to bring it**
  - If we did not use the library, the font becomes gray



```
import math
```

  - Else…

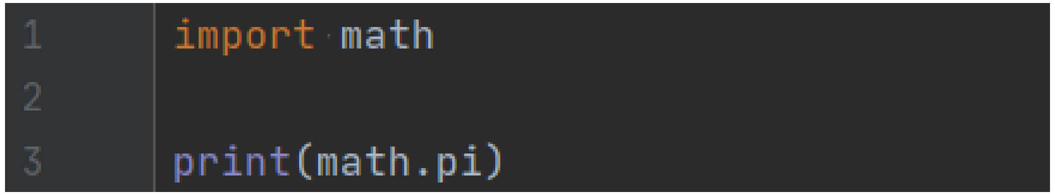


```
import math
```

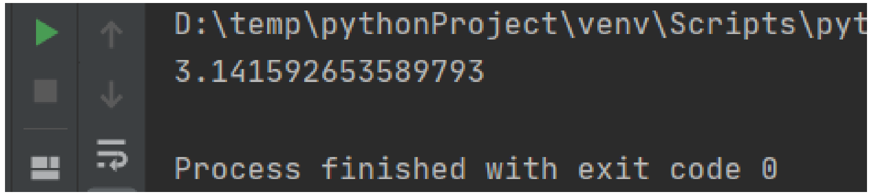
Using Library: math [2]

- Then use with (LibName).(Name)

- Let’s use π(pi)

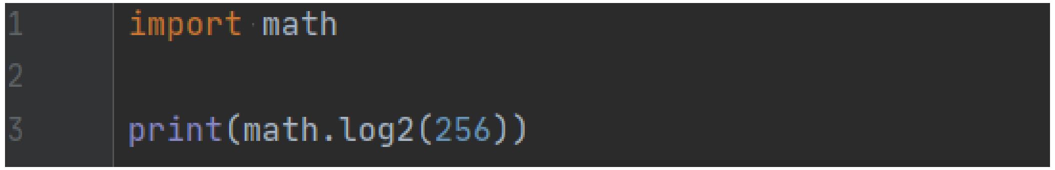


```python
import math

print(math.pi)
```

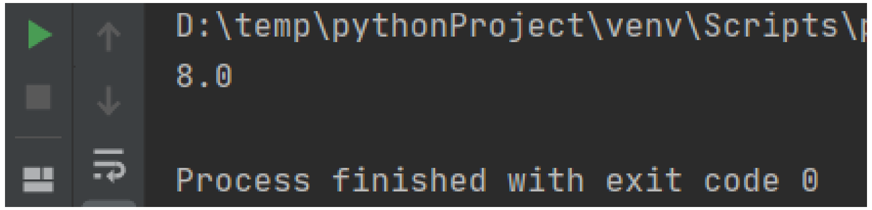


```
D:\temp\pythonProject\venv\Scripts\pyt
3.141592653589793

Process finished with exit code 0
```

- How about function?



```python
import math

print(math.log2(256))
```

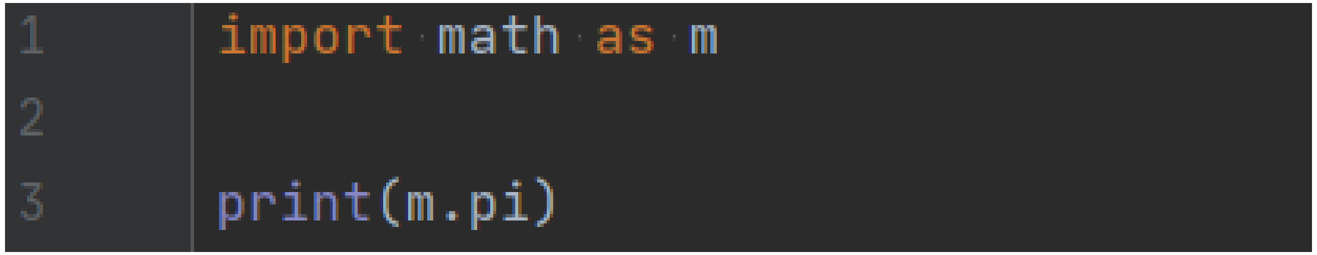


```
D:\temp\pythonProject\venv\Scripts\p
8.0

Process finished with exit code 0
```

Using Library: Alias

- **We can use “alias” of the library**
  - Using math.(name) every time is annoying
    - There are libraries with long name(e.g. multiprocessing, matplotlib.pyplot)
  - How about using “m” instead of “math”?

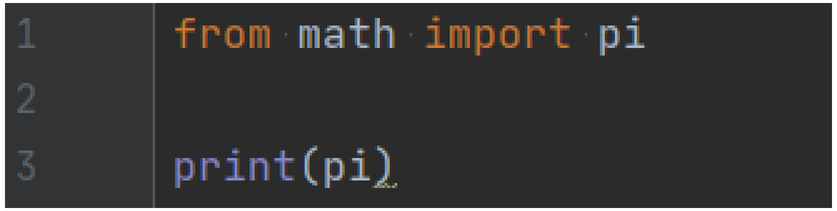
- **Use as keyword!**



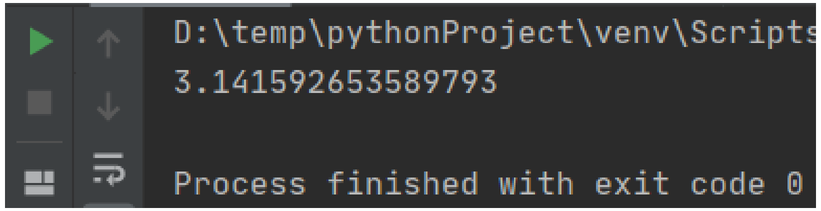
```python
import math as m

print(m.pi)
```

Using Library: `from`

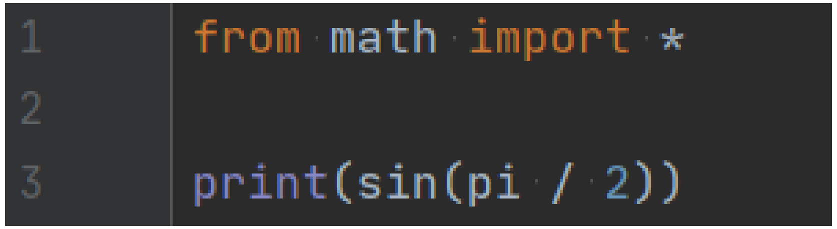
- **Using `from`, we can use several items in the library**
  - Of course, we can use all items by using " * "



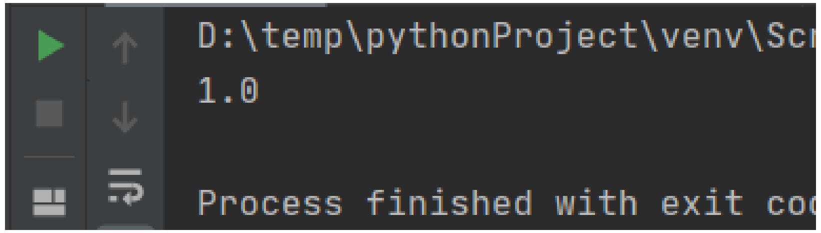
```python
from math import pi

print(pi)
```



```
D:\temp\pythonProject\venv\Scripts
3.141592653589793

Process finished with exit code 0
```



```python
from math import *

print(sin(pi / 2))
```

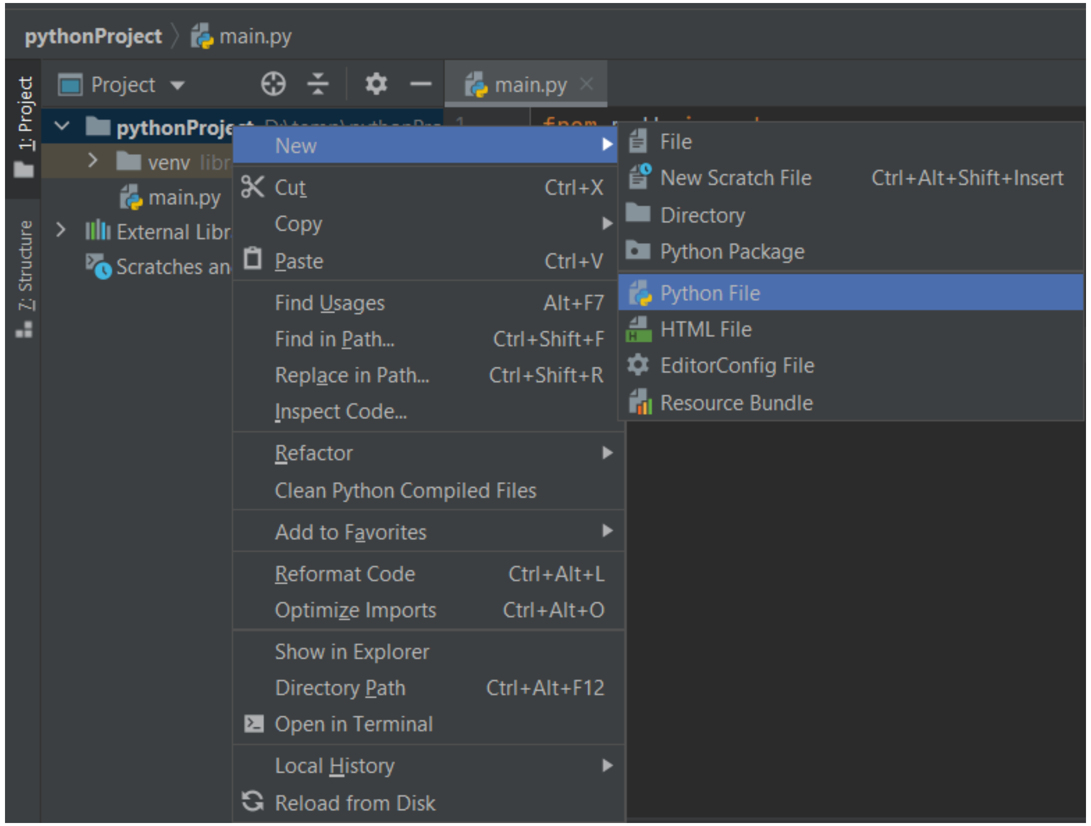


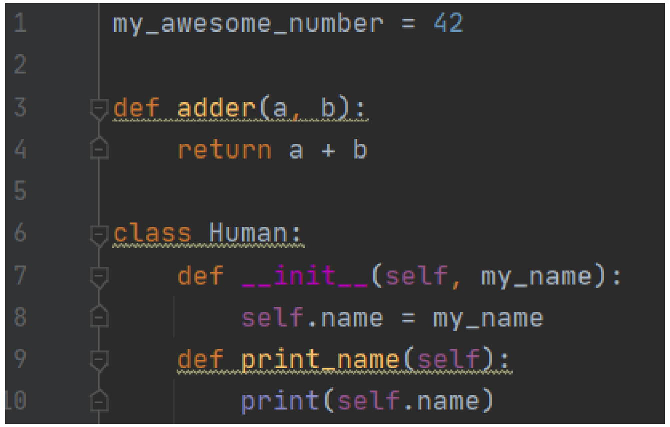
```
D:\temp\pythonProject\venv\Scr
1.0

Process finished with exit coc
```

- **Note that we do not use "`math.`" !!**

Making Library [1]

- **We can make our own library**
  - Just define some functions / classes / variables in a file!

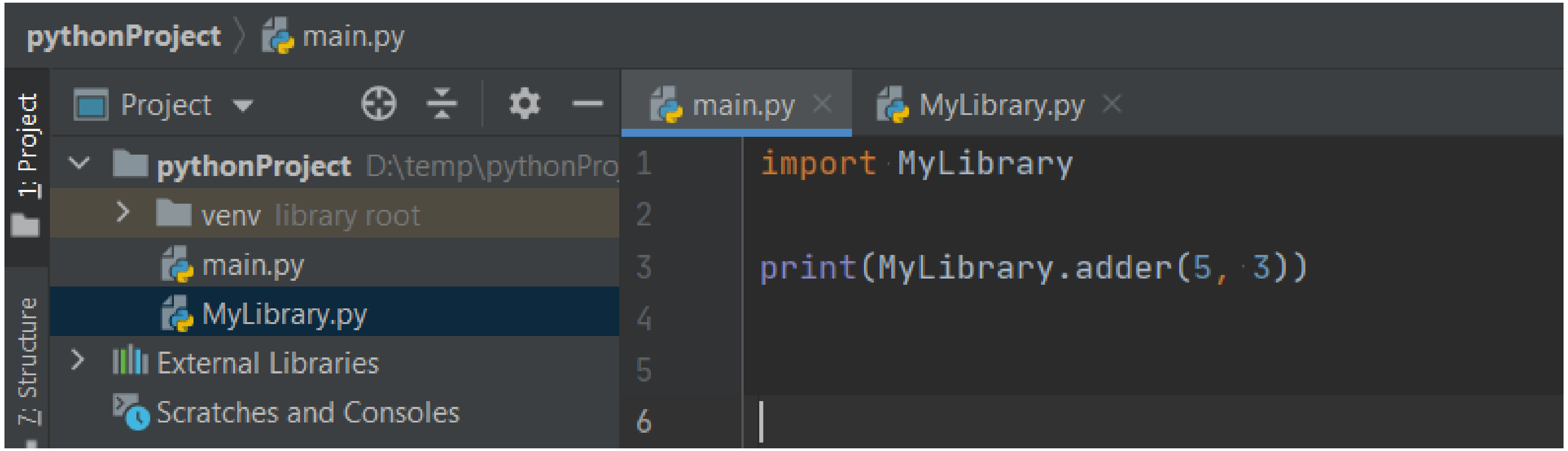




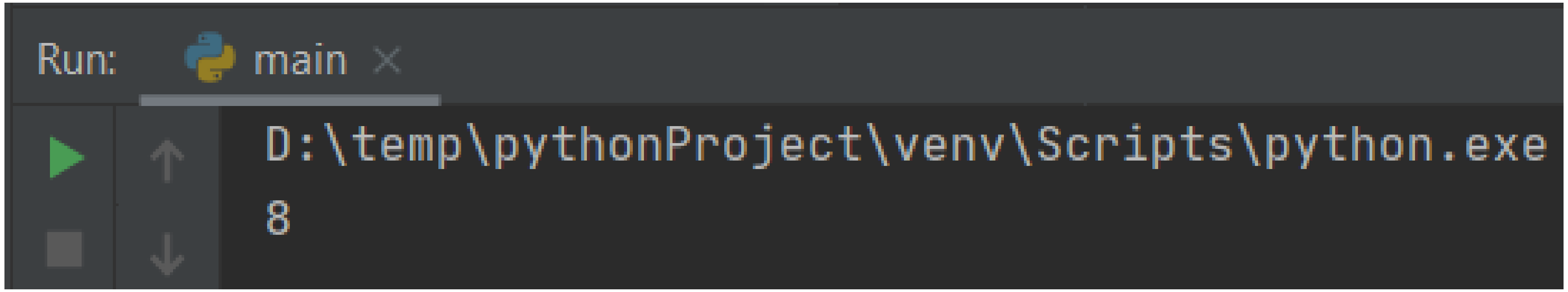
```python
my_awesome_number = 42

def adder(a, b):
    return a + b

class Human:
    def __init__(self, my_name):
        self.name = my_name
    def print_name(self):
        print(self.name)
```

Making Library [2]

- **Then, how can we use it?**
  - Just import! (If it is in same directory)



```python
import MyLibrary

print(MyLibrary.adder(5, 3))
```



```
D:\temp\pythonProject\venv\Scripts\python.exe
8
```

Exercises

- **Some exercises for you are in “exercises”**

In the Real-time Class…

- **We will have a lab session (mini project)**
  - We will upload the material as soon as possible

- **Before that, please review what we covered**
  - Supplement and exercises were uploaded
  - Feel free to ask us! Via…
    - Comment in the page (recommended!)
    - WhatsApp
    - E-mail

Thank you