CSIT110

Fundamental Programming with Python

Getting started

Goh X. Y.

Common uses of programming

Software designs

Hardware designs

Communications

…

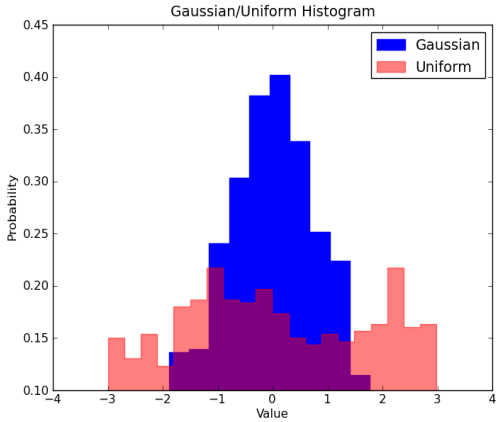
Common uses of Python

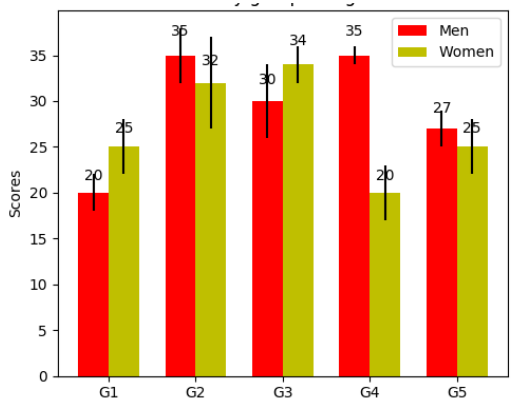
Data visualization

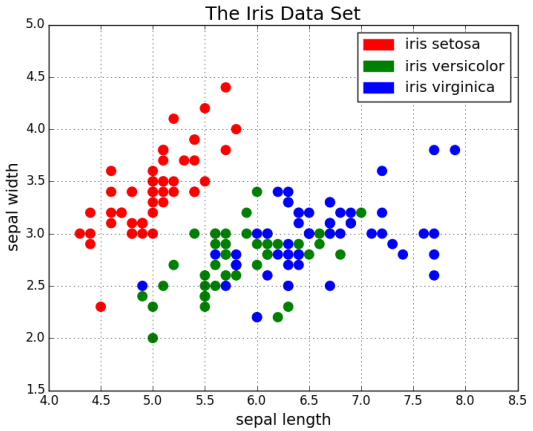
Computer vision research and applications

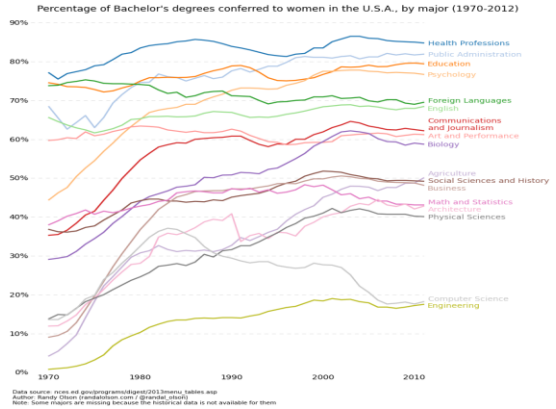
Machine learning research and applications

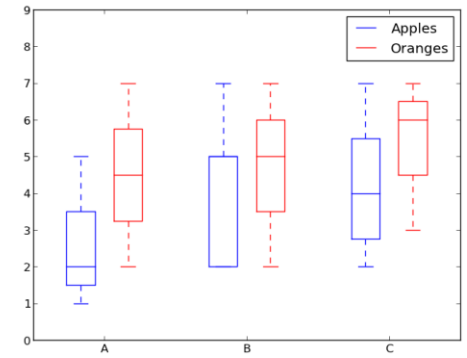
…

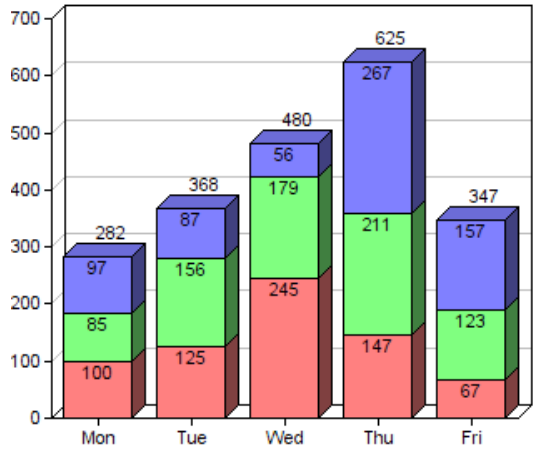


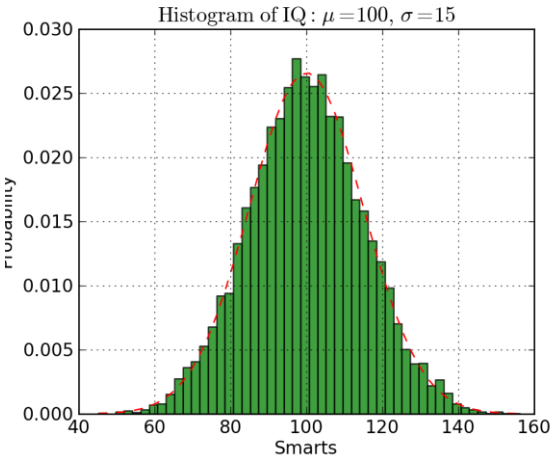












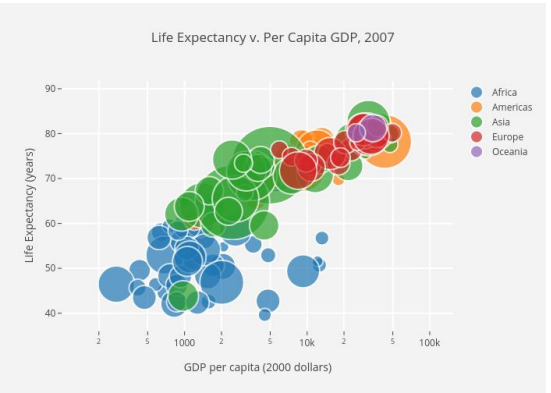


Image source: https://towardsdatascience.com/5-quick-and-easy-data-visualizations-in-python-with-code-a2284bae952f

Images from:
https://www.pyimagesearch.com/2018/11/12/yolo-object-detection-with-opencv/
https://www.learnopencv.com/pytorch-for-beginners-semantic-segmentation-using-torchvision/

PYPL PopularitY of Programming Language

Worldwide, Sept 2020 compared to a year ago:

Rank	Change	Language	Share	Trend
1		Python	31.56 %	+2.9 %
2		Java	16.4 %	-3.1 %
3		Javascript	8.38 %	+0.3 %
4		C#	6.5 %	-0.8 %
5		PHP	5.85 %	-0.5 %
6		C/C++	5.8 %	+0.0 %
7		R	4.08 %	+0.3 %
8		Objective-C	2.79 %	+0.2 %
9		Swift	2.35 %	-0.1 %
10		TypeScript	1.92 %	+0.1 %
11		Matlab	1.65 %	-0.1 %
12		Kotlin	1.61 %	+0.1 %
13	↑↑	Go	1.44 %	+0.3 %
14	↓	Ruby	1.22 %	-0.2 %

The PYPL PopularitY of Programming Language Index is created by analyzing how often language tutorials are searched on Google.

The more a language tutorial is searched, the more popular the language is assumed to be. It is a leading indicator. The raw data comes from Google Trends.

If you believe in collective wisdom, the PYPL Popularity of Programming Language index can help you decide which language to study, or which one to use in a new software project.

- ✓ extensive support modules
- ✓ easy integration with web services
- ✓ user-friendly data structures
- ✓ free

Learning Objectives

- Introduction
  - Online resources
  - Installation
  - Sequential Programming
- Data types and structures
- Control flow and iteration
- Functions
- Class
- Best practices

Course Information

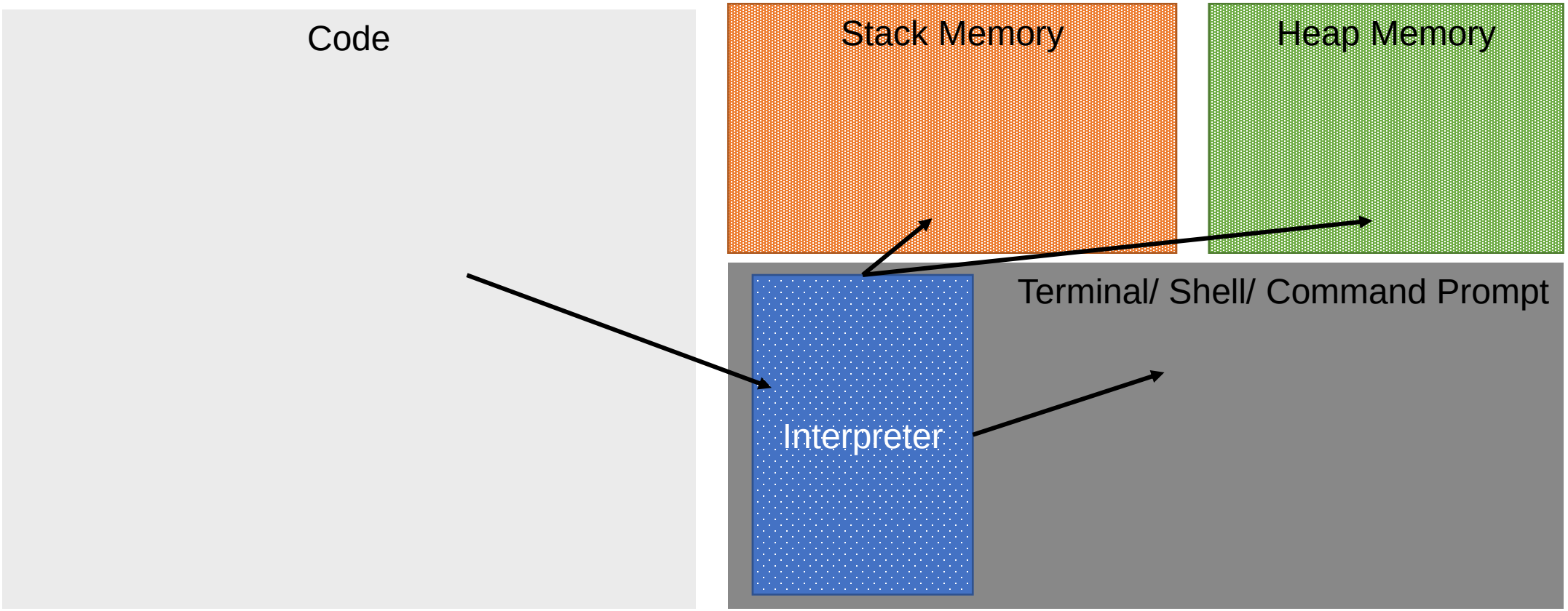
- Python 3.x.x
- Tutorials
- Assignments Examination

What do I need?

- Python interpreter

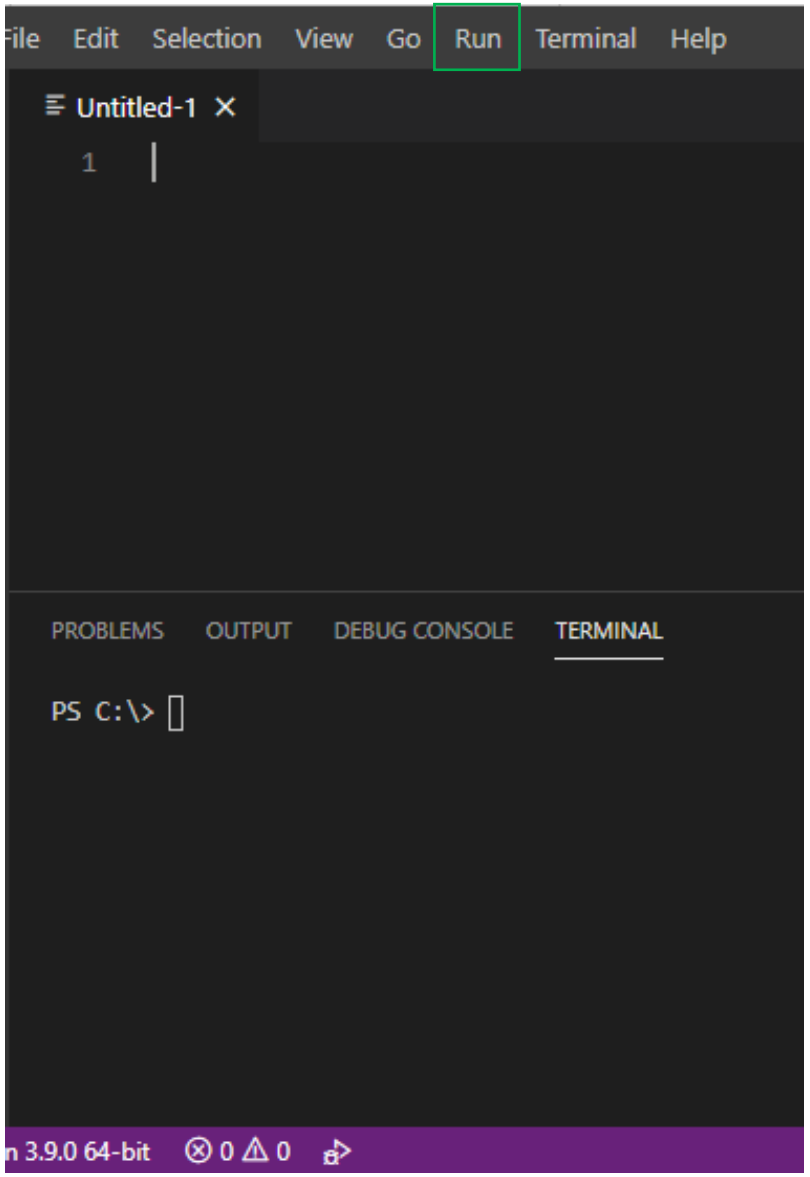
- Code editor

Components


Code
Stack Memory
Heap Memory
Terminal/ Shell/ Command Prompt
Interpreter

In the slides,

Interpreter




```
# Text in the grey boxes are code
```

text in the boxes are what you will see in the terminal

Integrated Development Environment

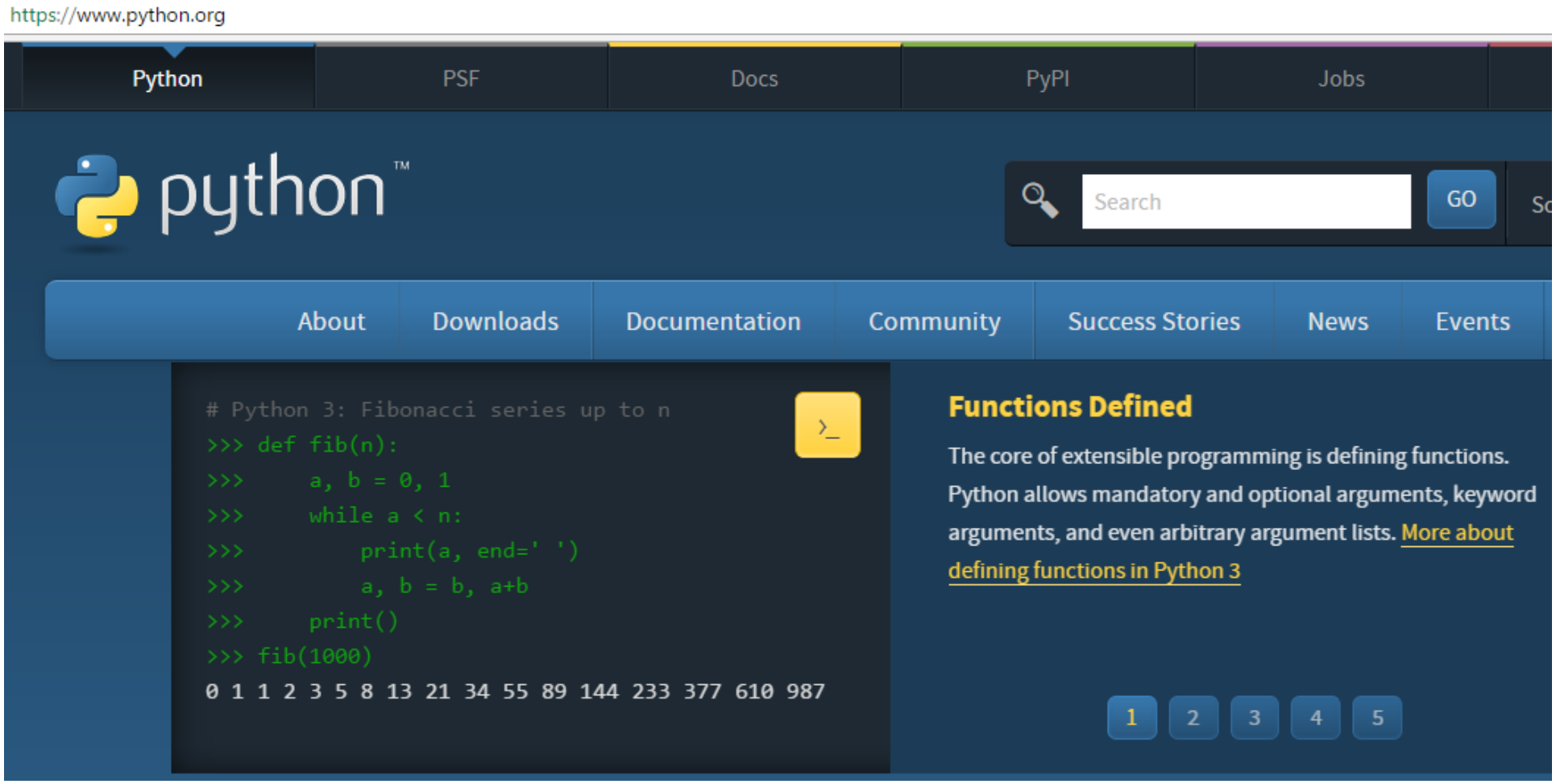
has

- source code editor
- automation tools
- a debugger
- console/terminal

Examples

- IDLE
- Pycharm
- Eclipse
- Spyder
- **Visual Studio Code**
- Atom

Python software foundation website: http://www.python.org



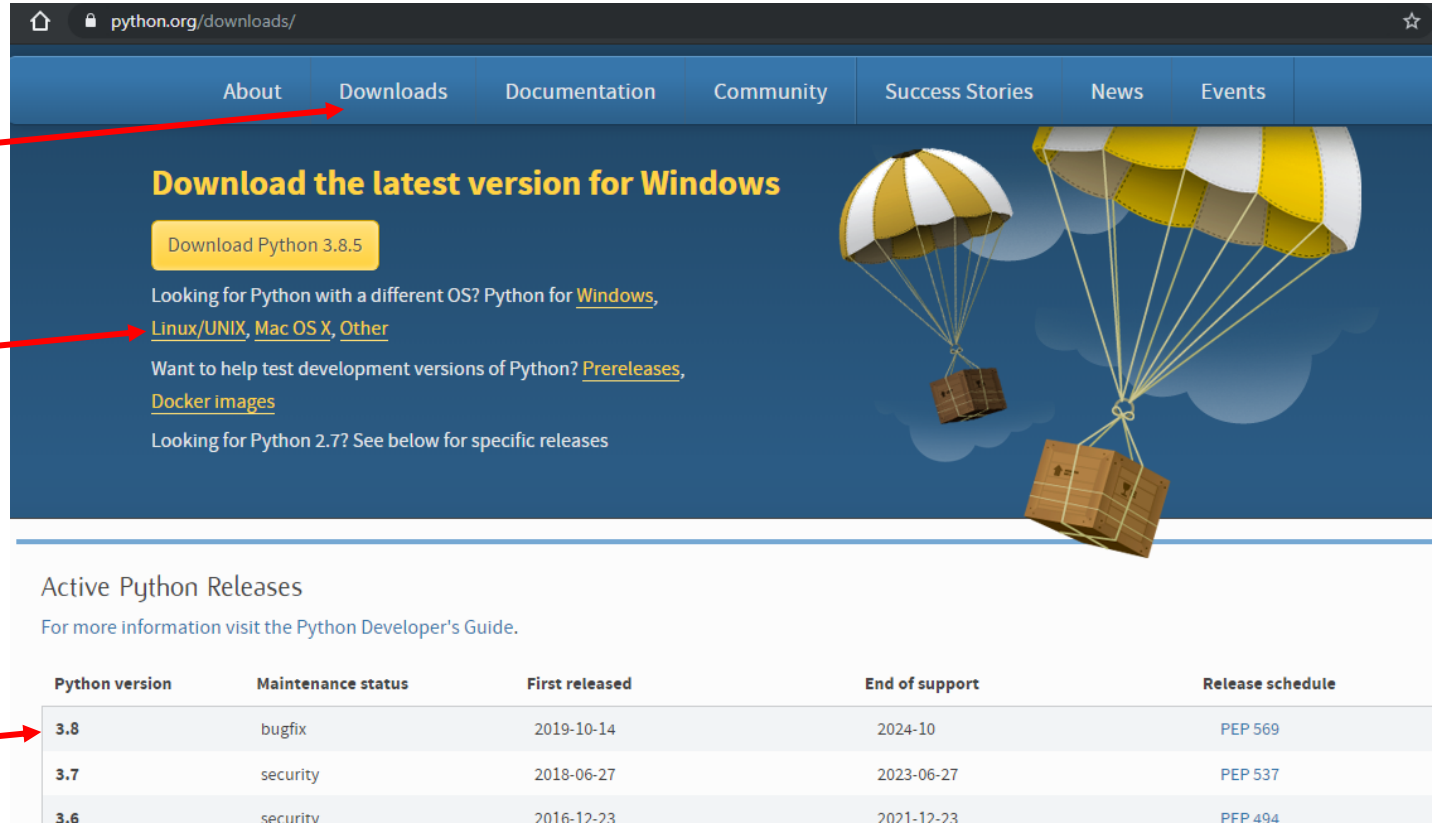
Python software foundation website: http://www.python.org

Useful resources available on this website:

- Getting started
- Tutorials
- Documentation
- Installation guide
- ...

Downloads

We are going to use Python Version 3 in this course.



What if I don't have computer/laptop at home?

What if my computer/laptop cannot install Python?

Online IDE

What if I don't have computer/laptop at home?

What if my computer/laptop cannot install Python?

Use online Python IDEs

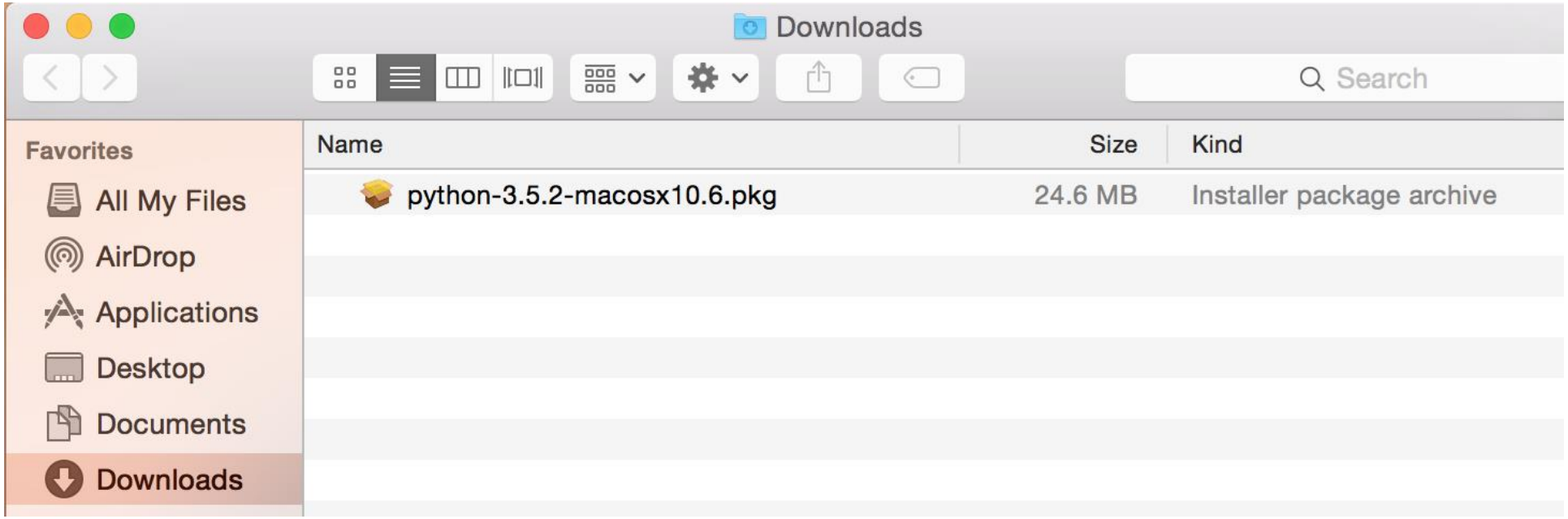
- http://colab.research.google.com
- http://repl.it
- http://pythontutor.com
- http://techmums.co/python.html
- https://www.tutorialspoint.com/execute_python3_online.php
- Google search for it
- https://vscode.dev/

Python installation for Windows

Installation - Mac

Run the download Python package

And follow the instructions in the installation wizard

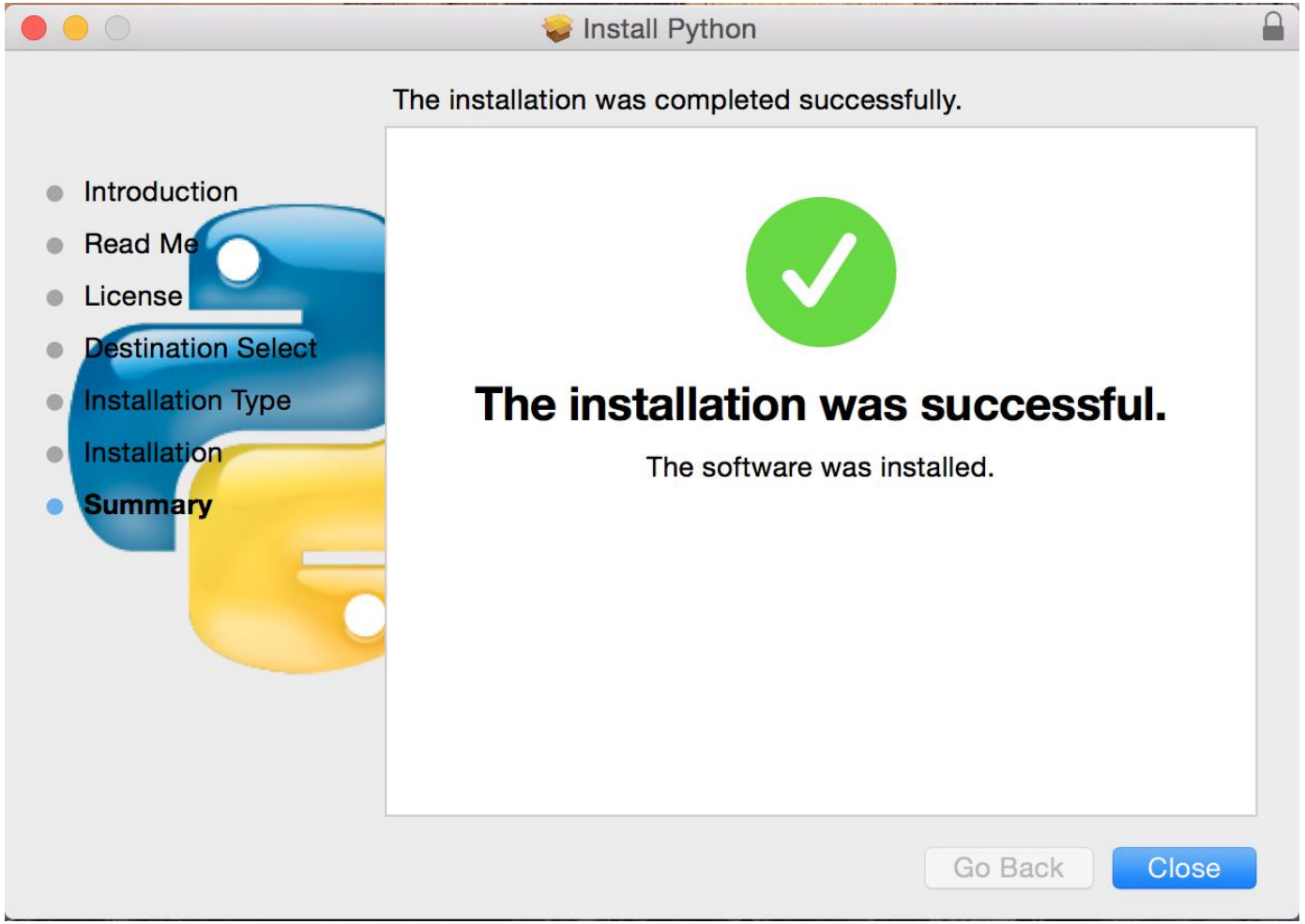


Installation - Windows

First, download and run the **Windows x86 executable** installer from Python webpage

Installation

Installation

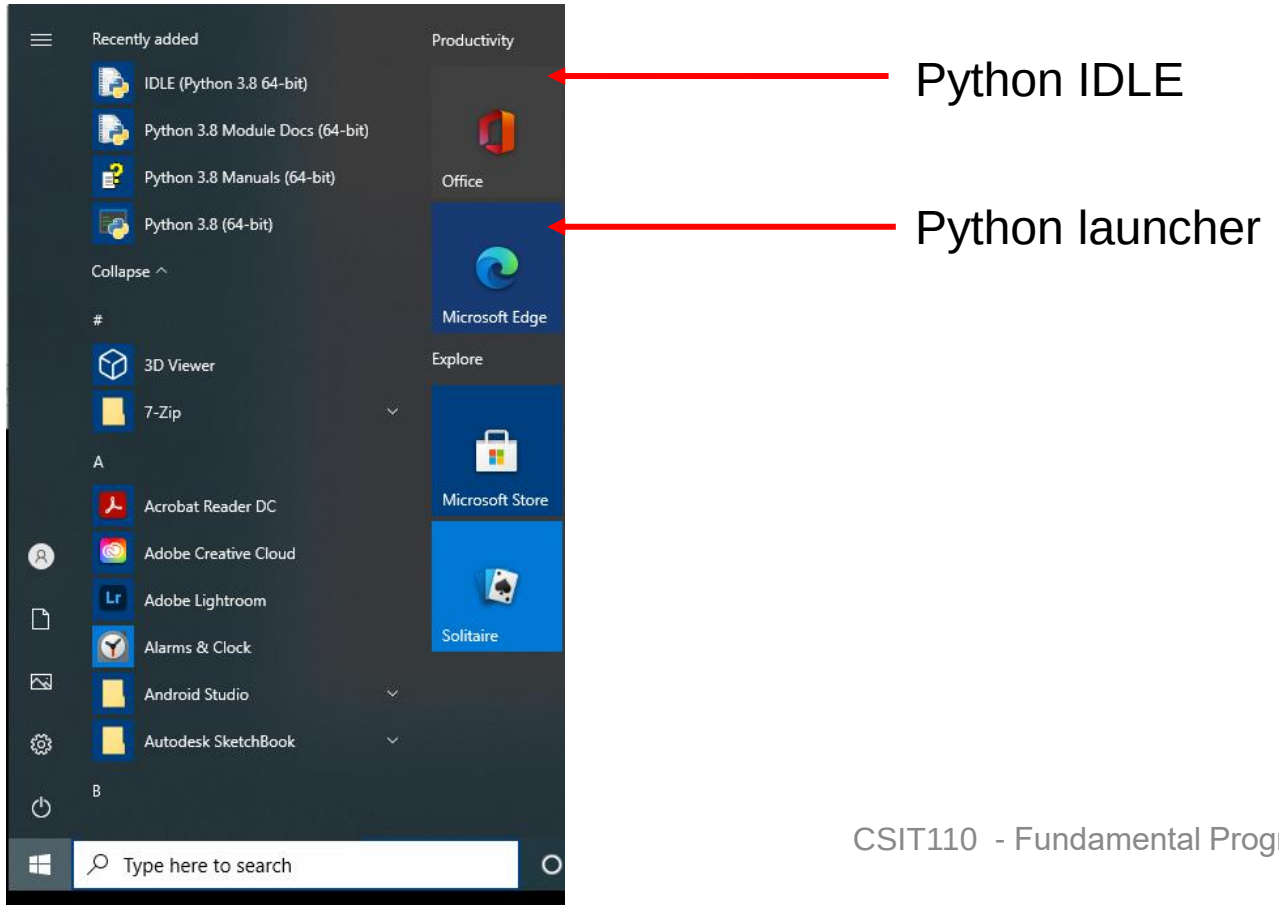


Installation - success

Windows

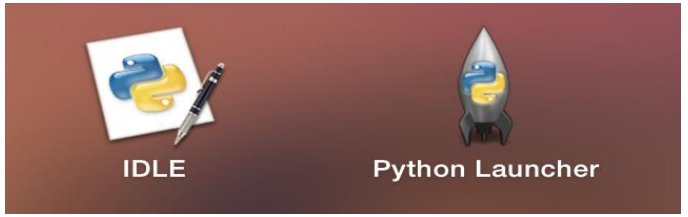
On Start Menu, I can see there are two icons for

Python Interpreter and Python IDLE



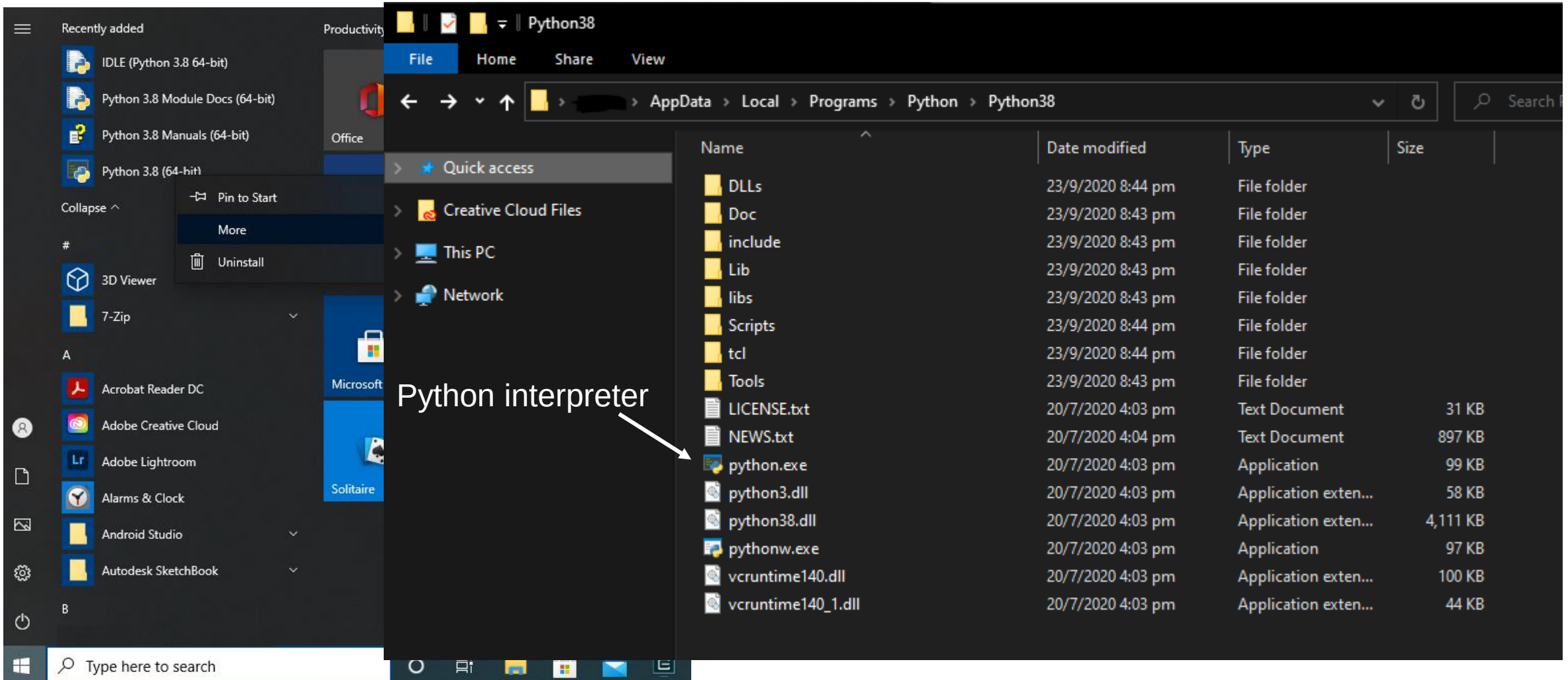
Mac

On the launch pad



Installation - Windows

After installation you can see the python application where it is installed

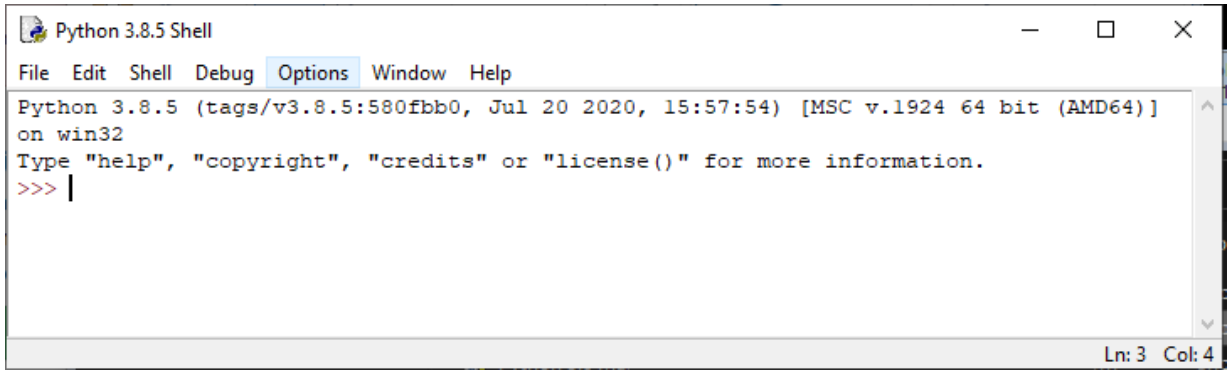


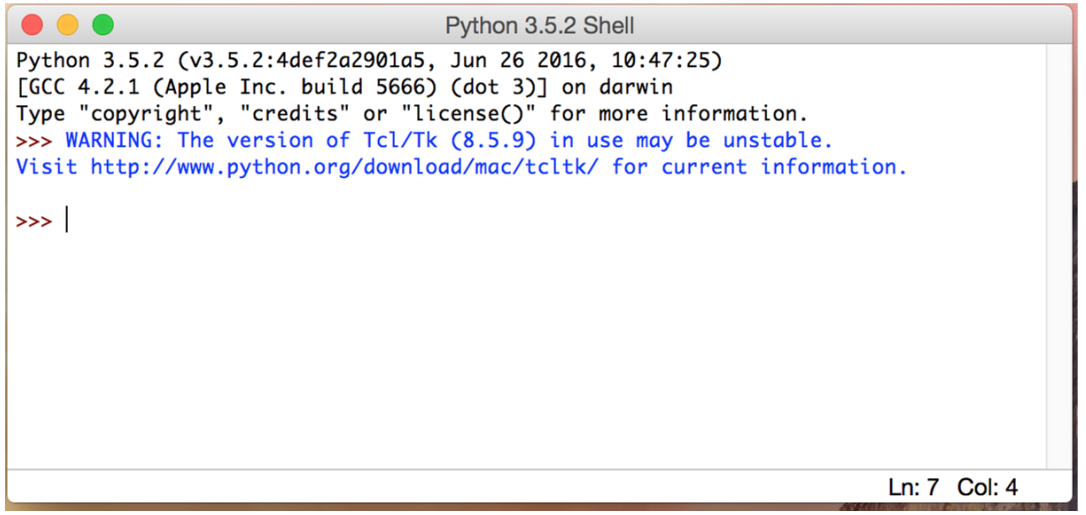
Python IDLE

IDLE

Click on the Python IDLE icon on the start menu,

a new window will appear. This will launch the interpreter in a shell

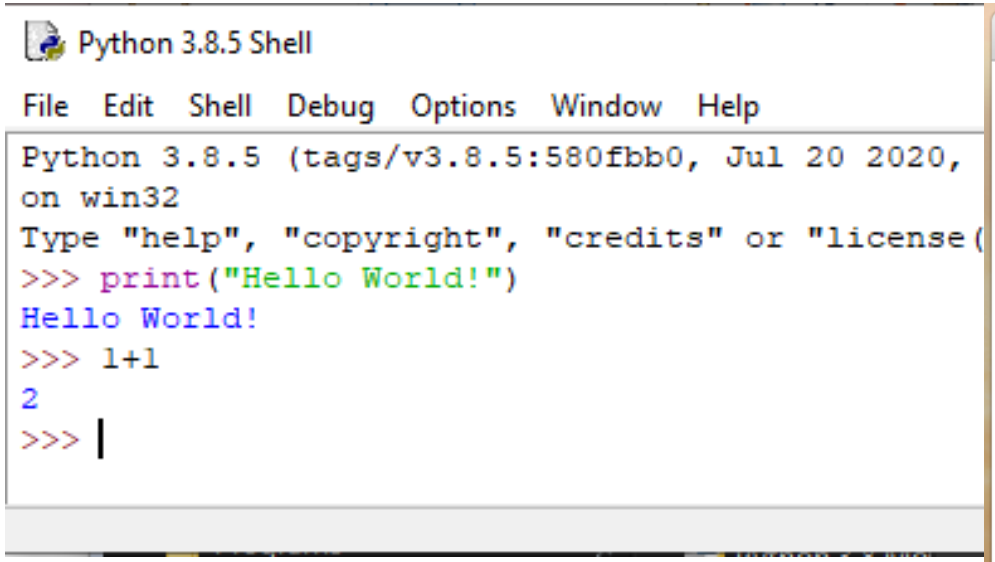


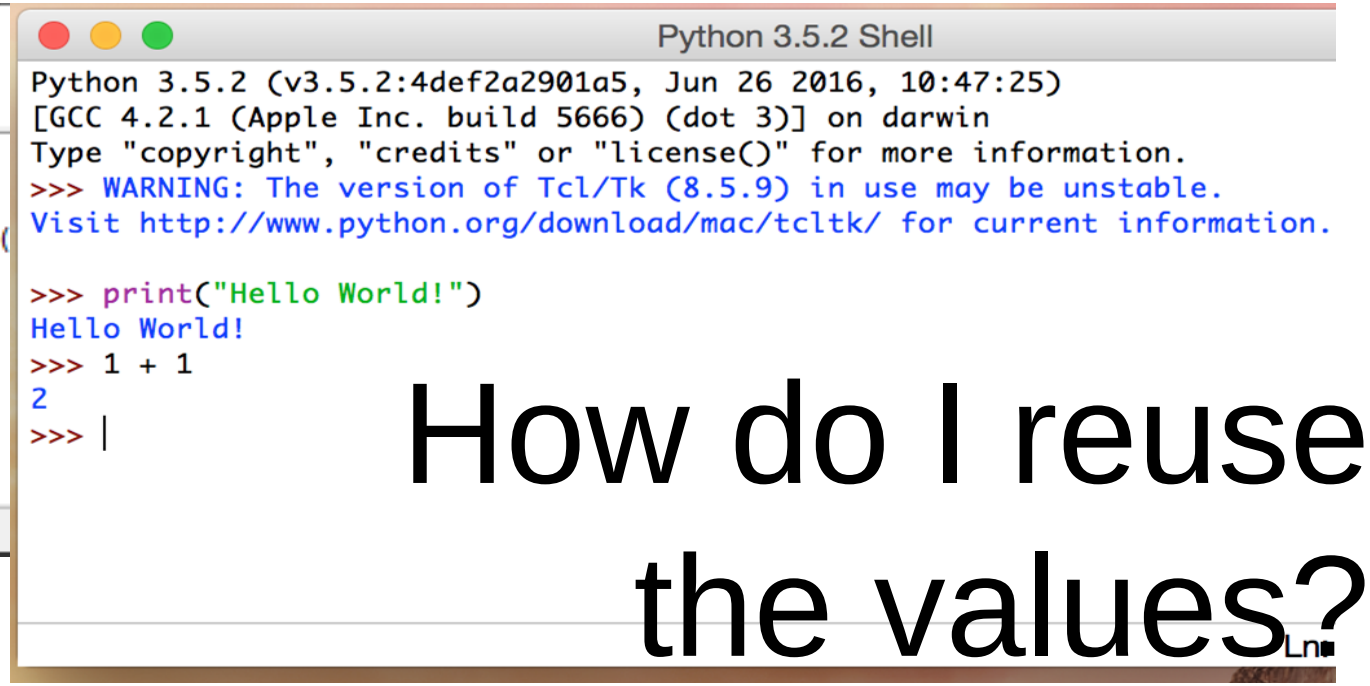


IDLE

Type the following Python code into the IDLE

```
>>>print(“Hello world!”)
>>>1+1
```





How do I reuse the values?

Variables

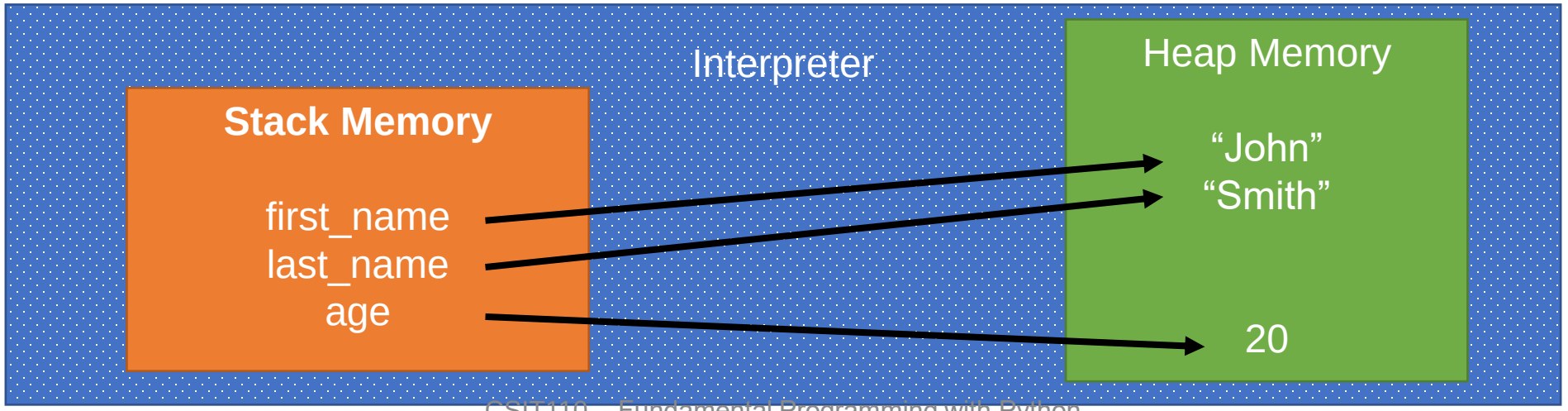
We **instantiate** variables and assign values to the variables

1. Variable name

```
first_name = "John"
last_name = "Smith"
age = 20
```

3. Values/ objects

2. Assignment operator



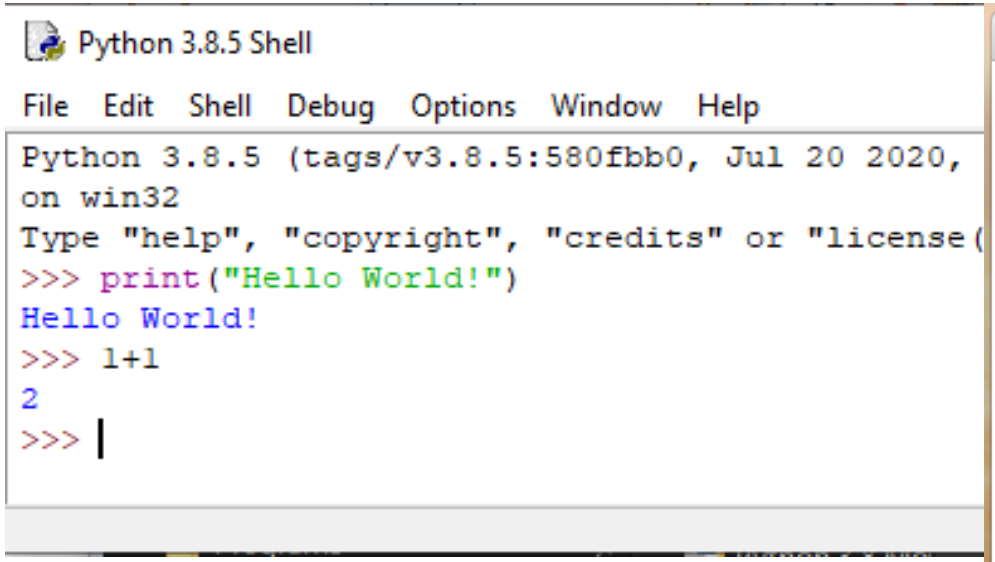
Attributes

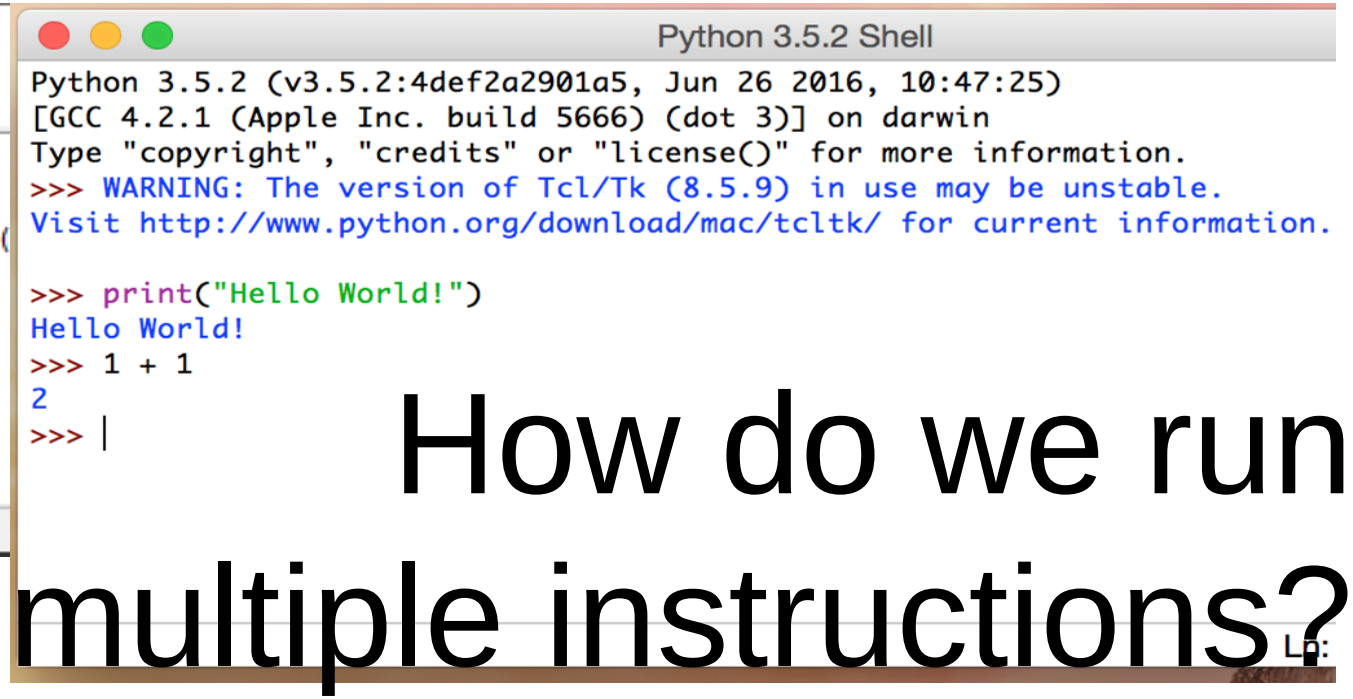
- Variables
- Functions
- Classes

IDLE

Type the following Python code into the IDLE

```
>>>print(“Hello world!”)
>>>1+1
```

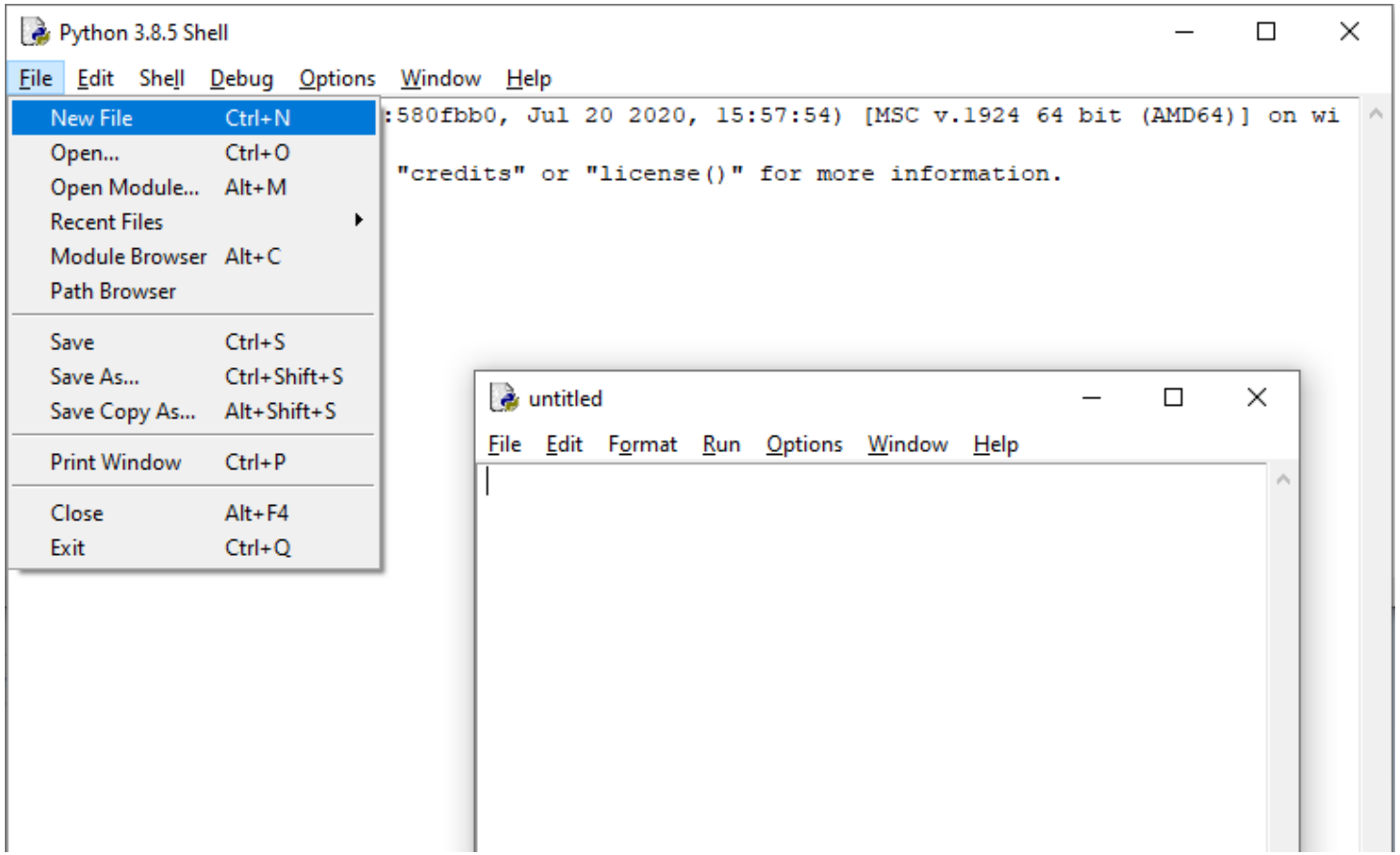




How do we run multiple instructions?

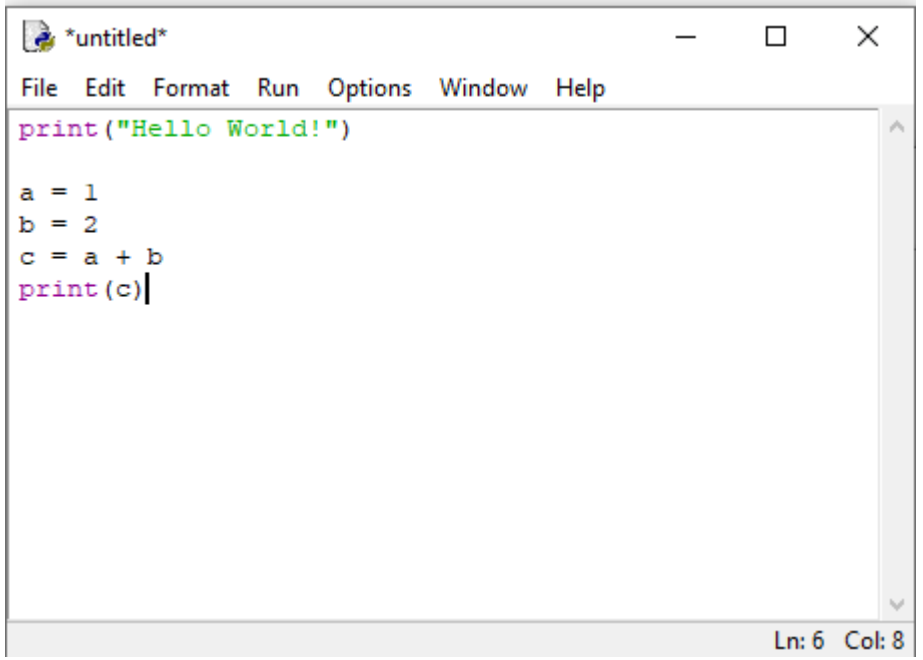
Python – Creating a Python file

Select the menu: File > New File, a new window will appear



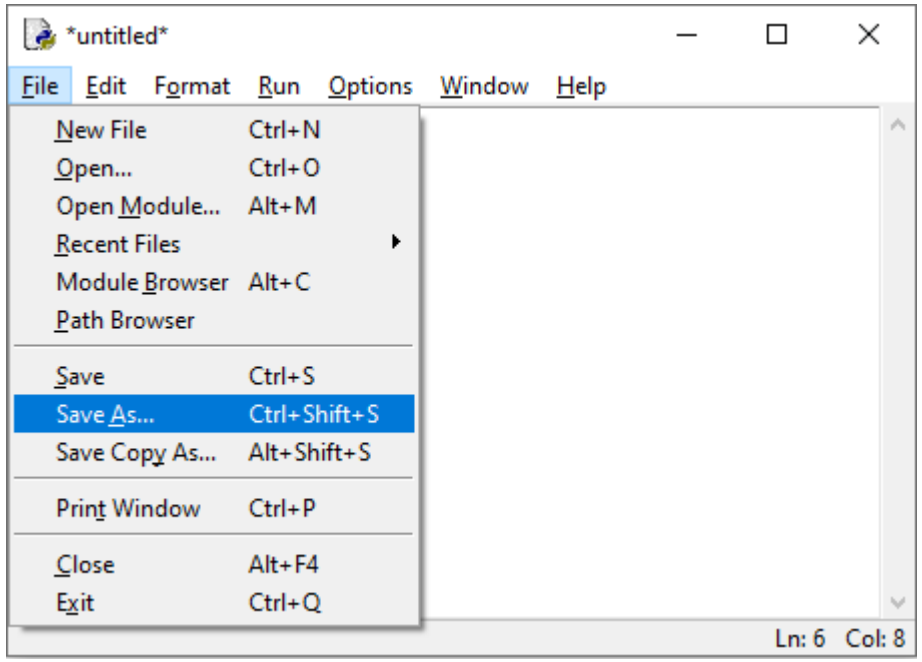
Python – Editing a Python file

Type the following Python code into the new window



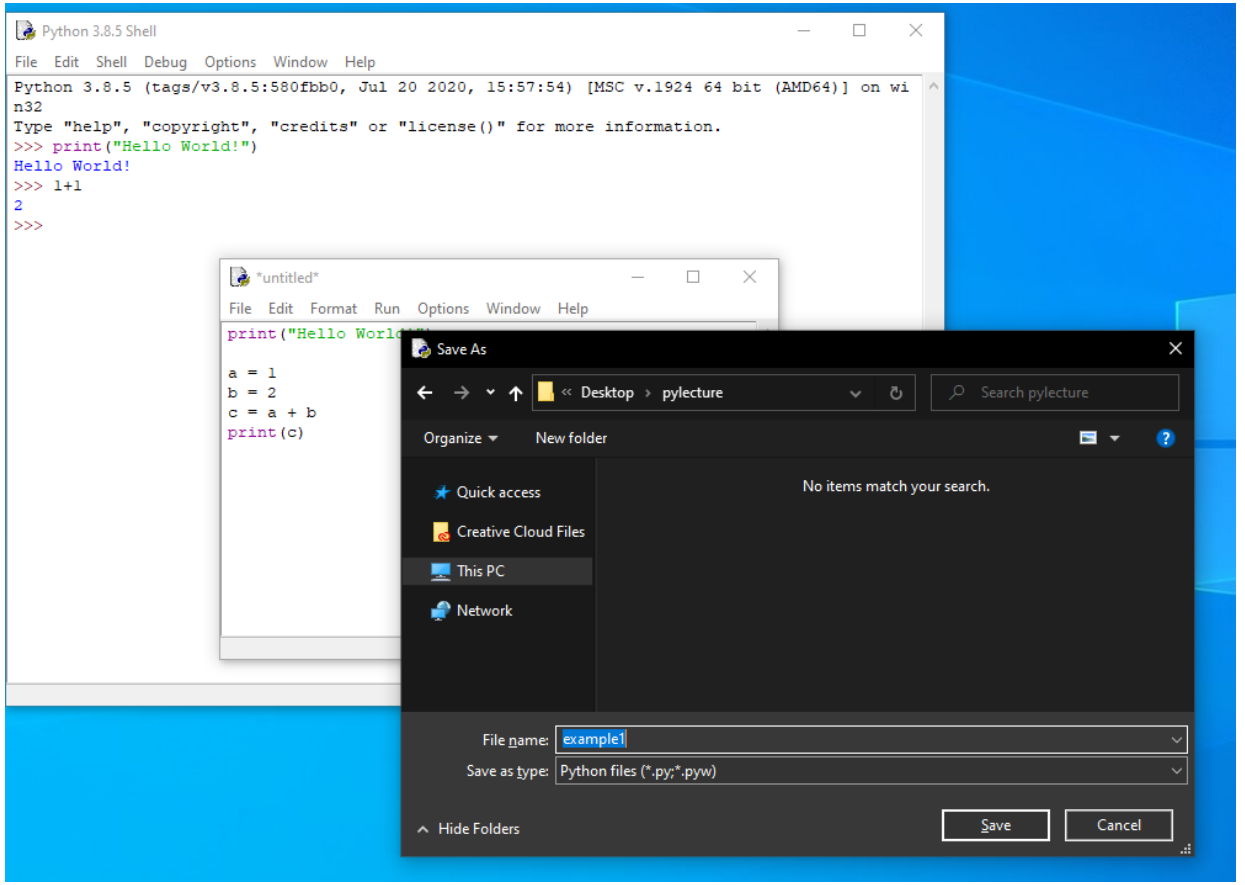
Python – Saving a Python file

Select the menu: File > Save As…



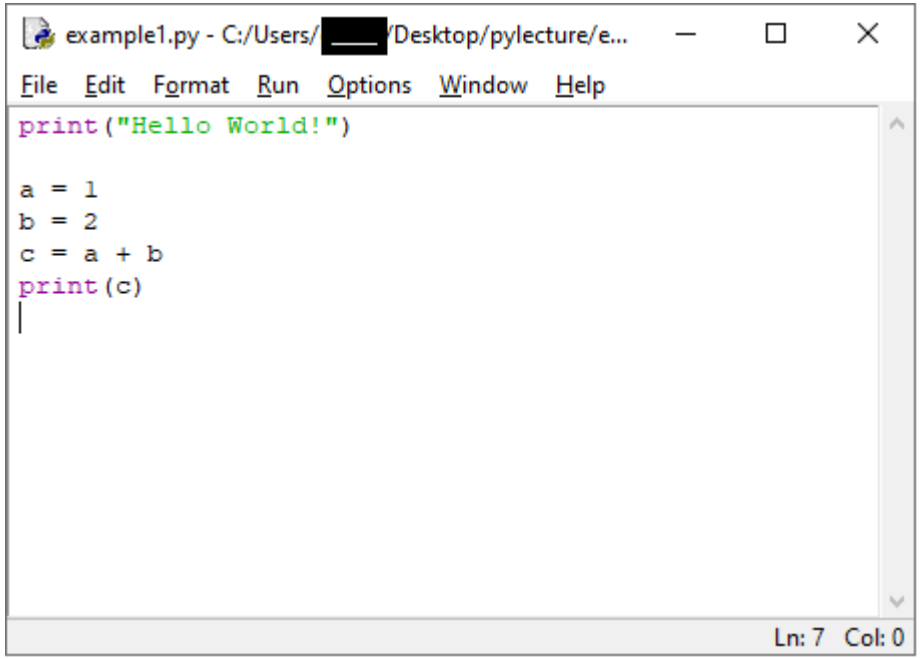
Python – Saving a Python file

I saved the code into a new file called **example1.py**



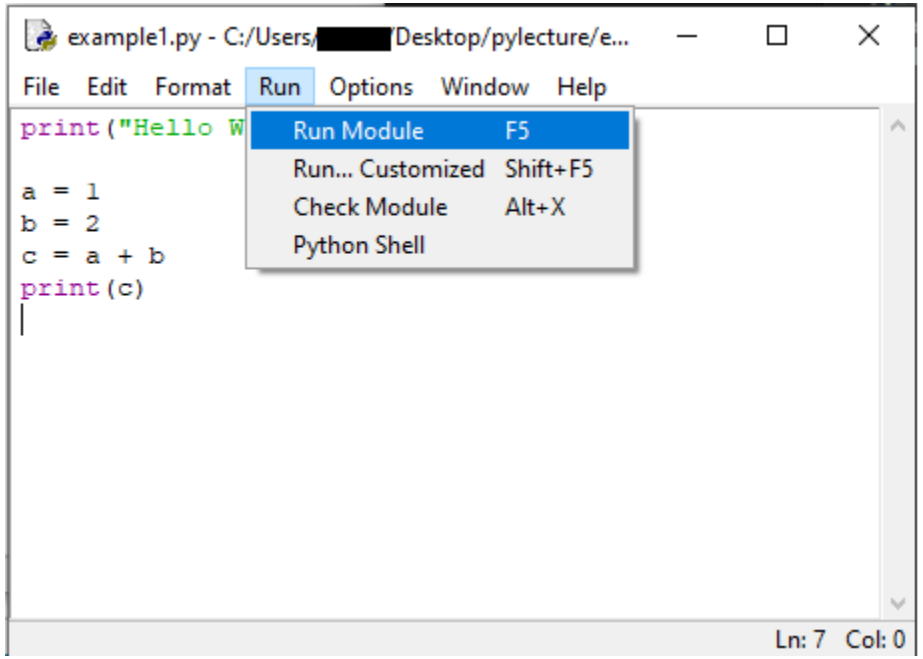
Python – A Python file

I can see now that my code has been saved to the file **example1.py**



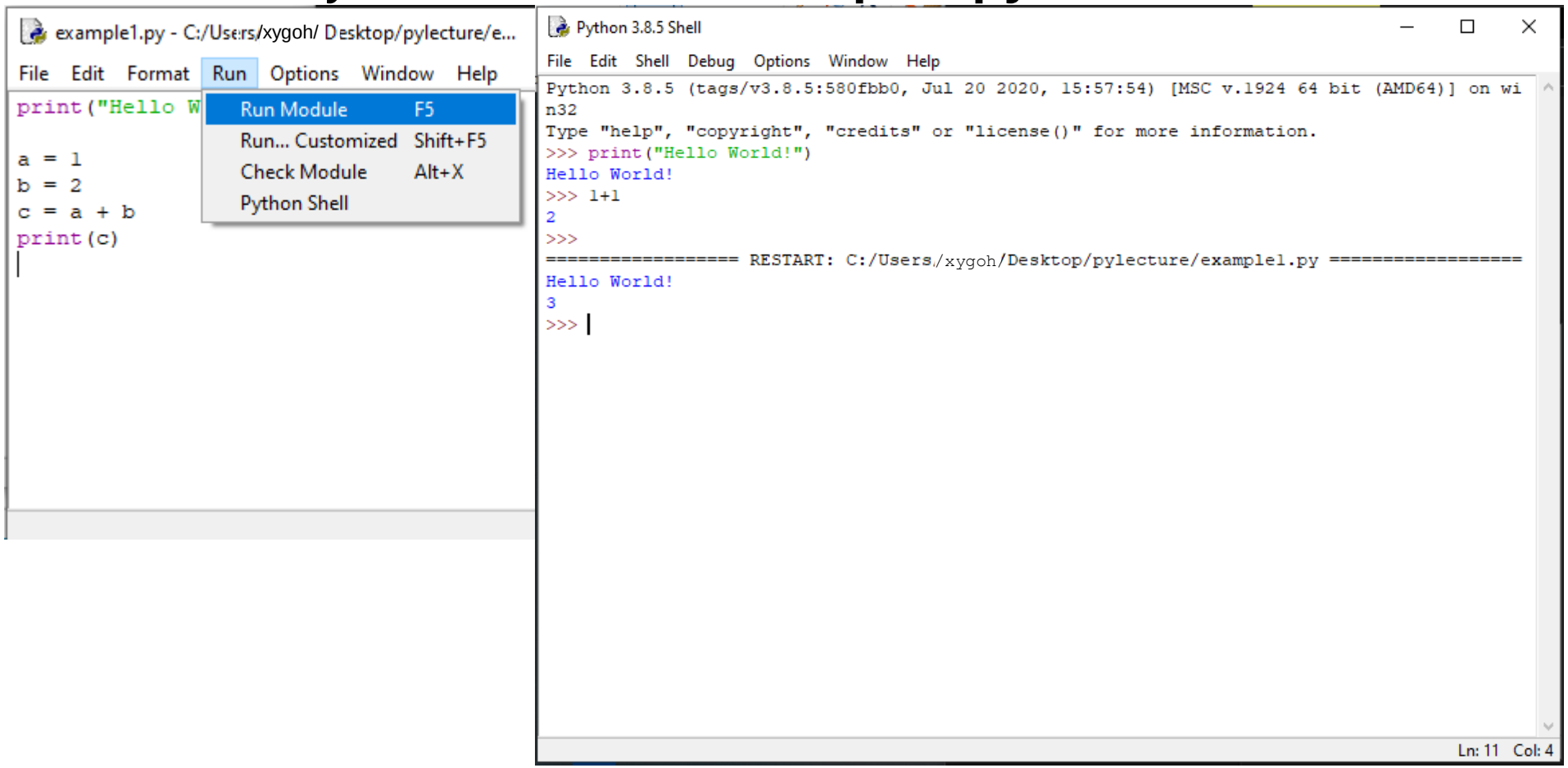
Python – Running a Python file

Select the menu: Run > Run Module



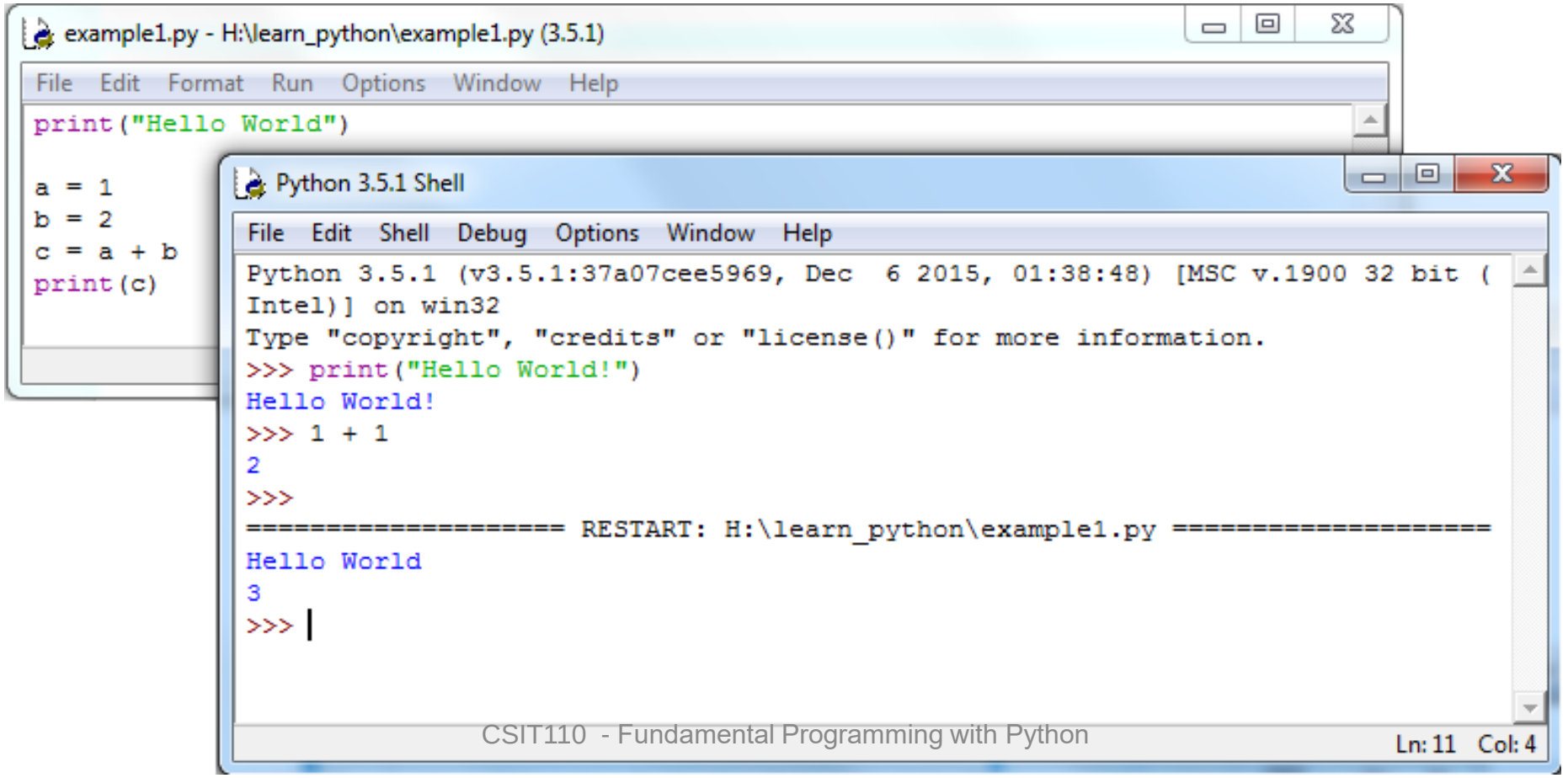
Python – Running a Python file

I can see that my code in the file **example1.py** works



Python – Sequential programming

The instructions are executed after the previous one has completed

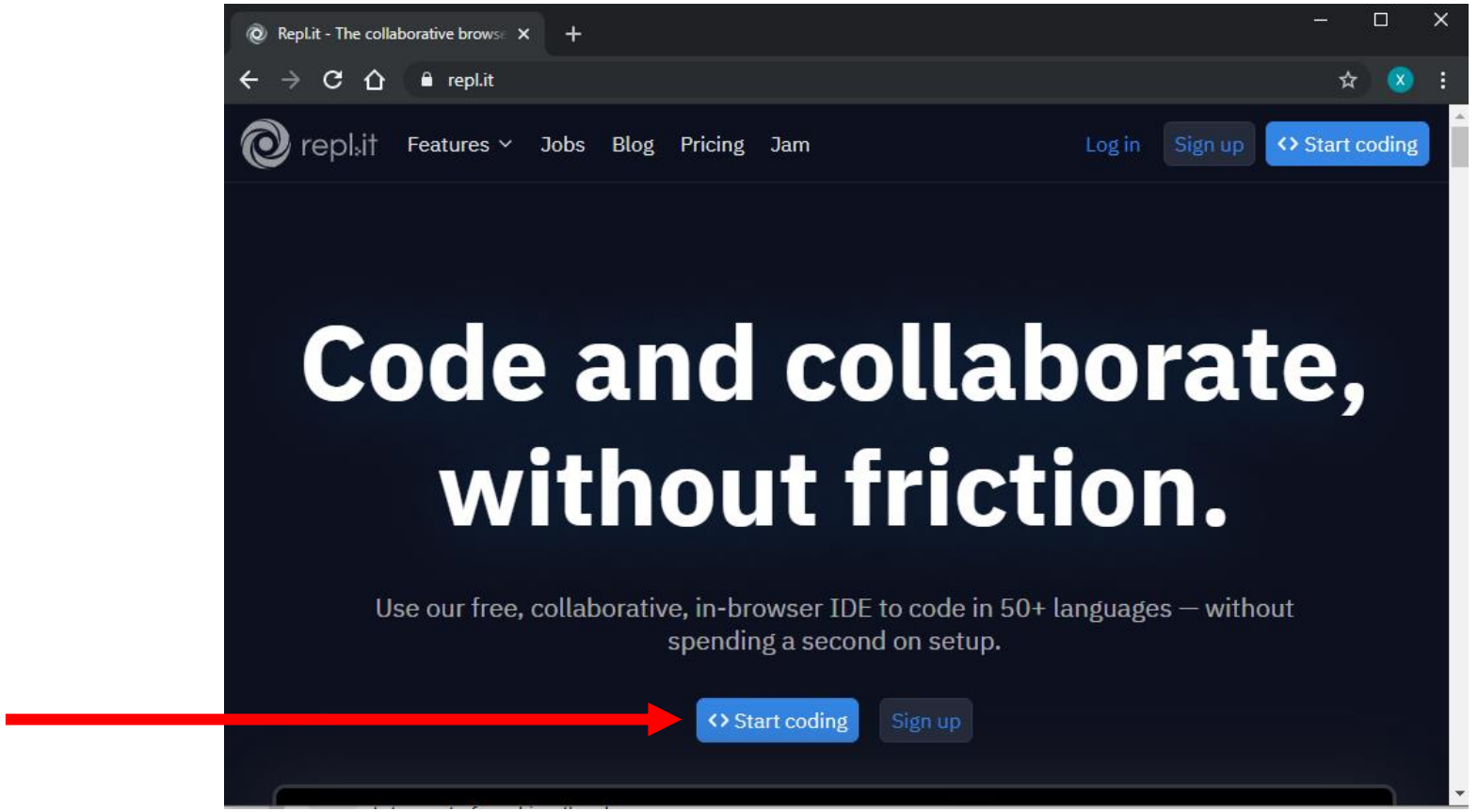


Online IDE - http://repl.it

Enter site -> ‘<> start coding’-> ‘Python’ -> ‘create repl’

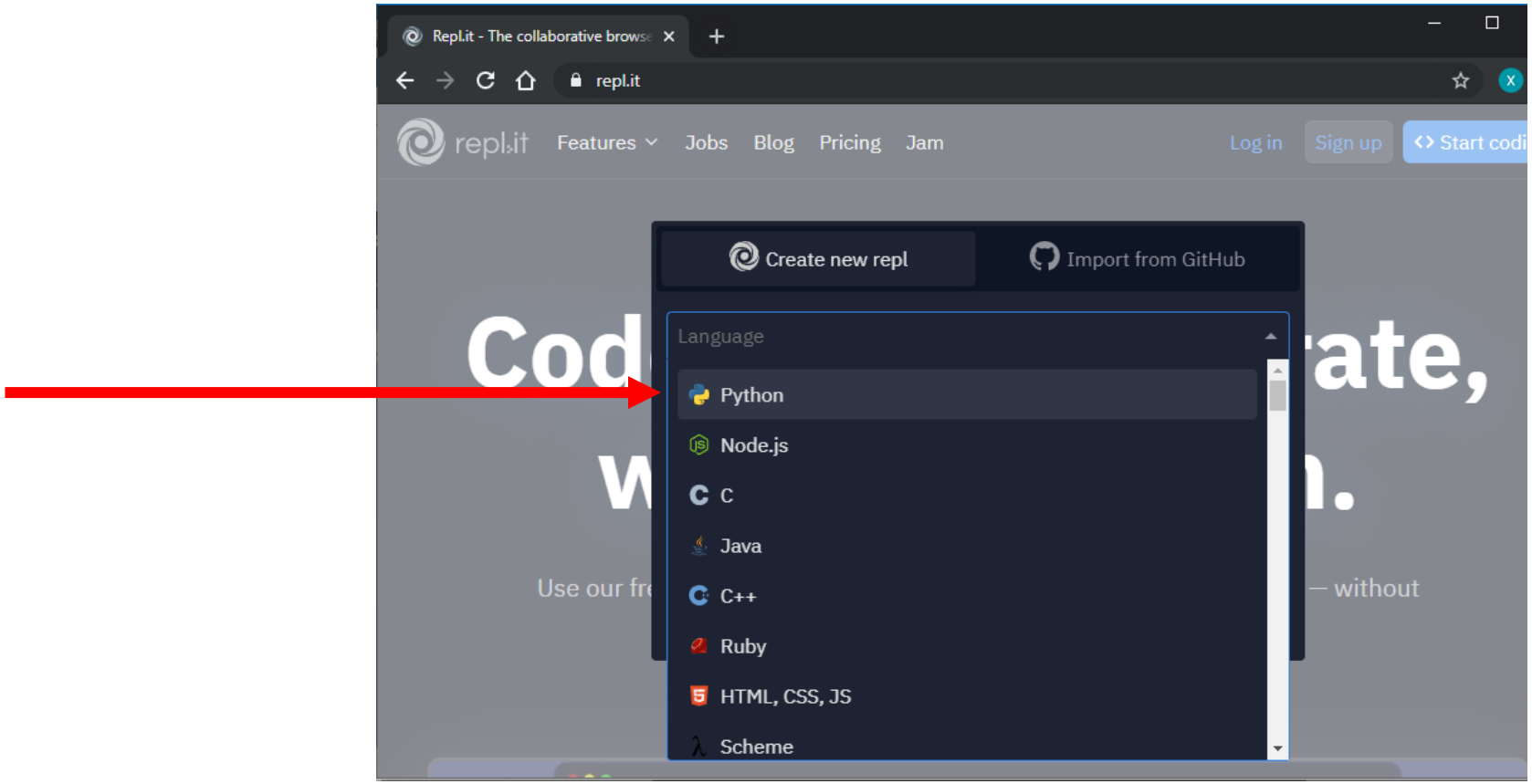
Online IDE - http://repl.it

Enter site -> ‘<> start coding



Online IDE - http://repl.it

Enter site -> '<> start coding'-> 'Python'



Online IDE - http://repl.it

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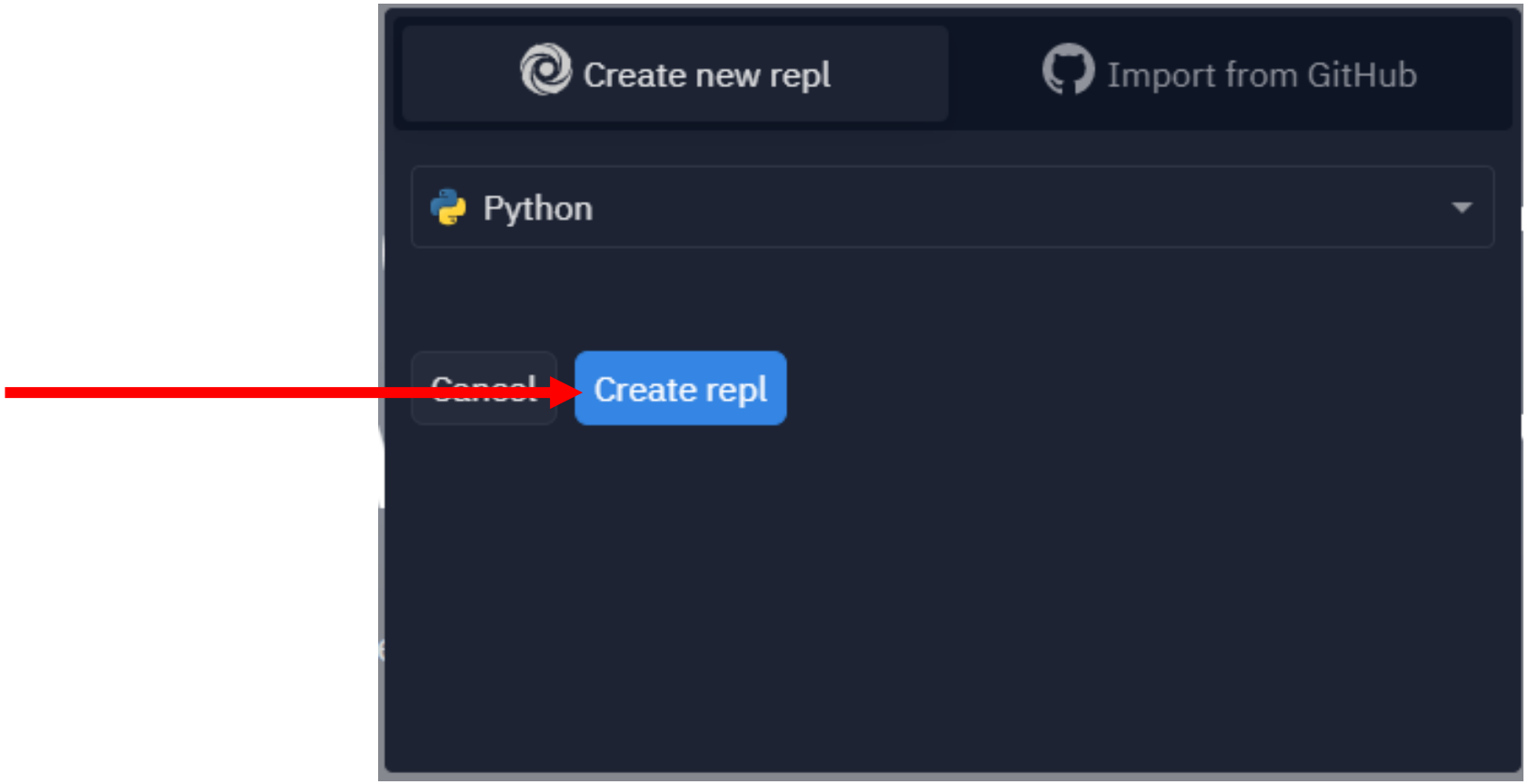
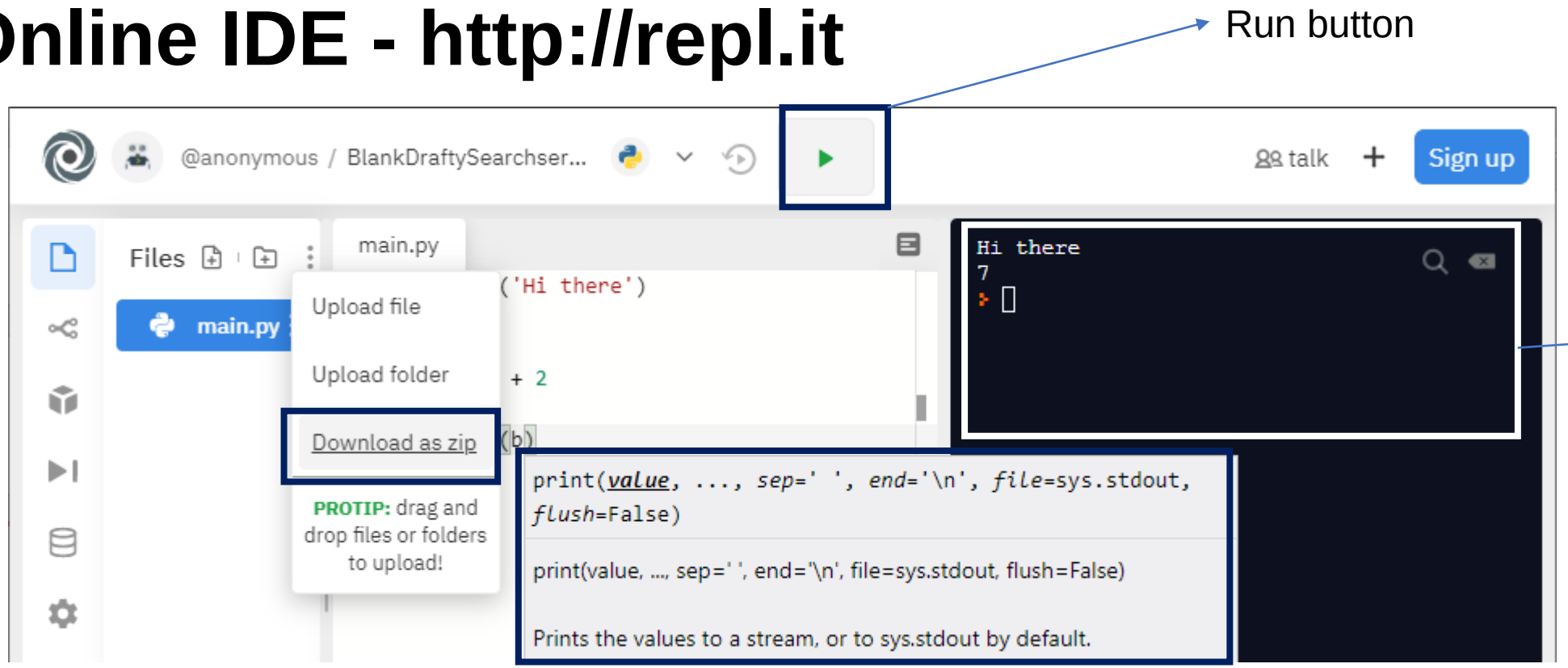


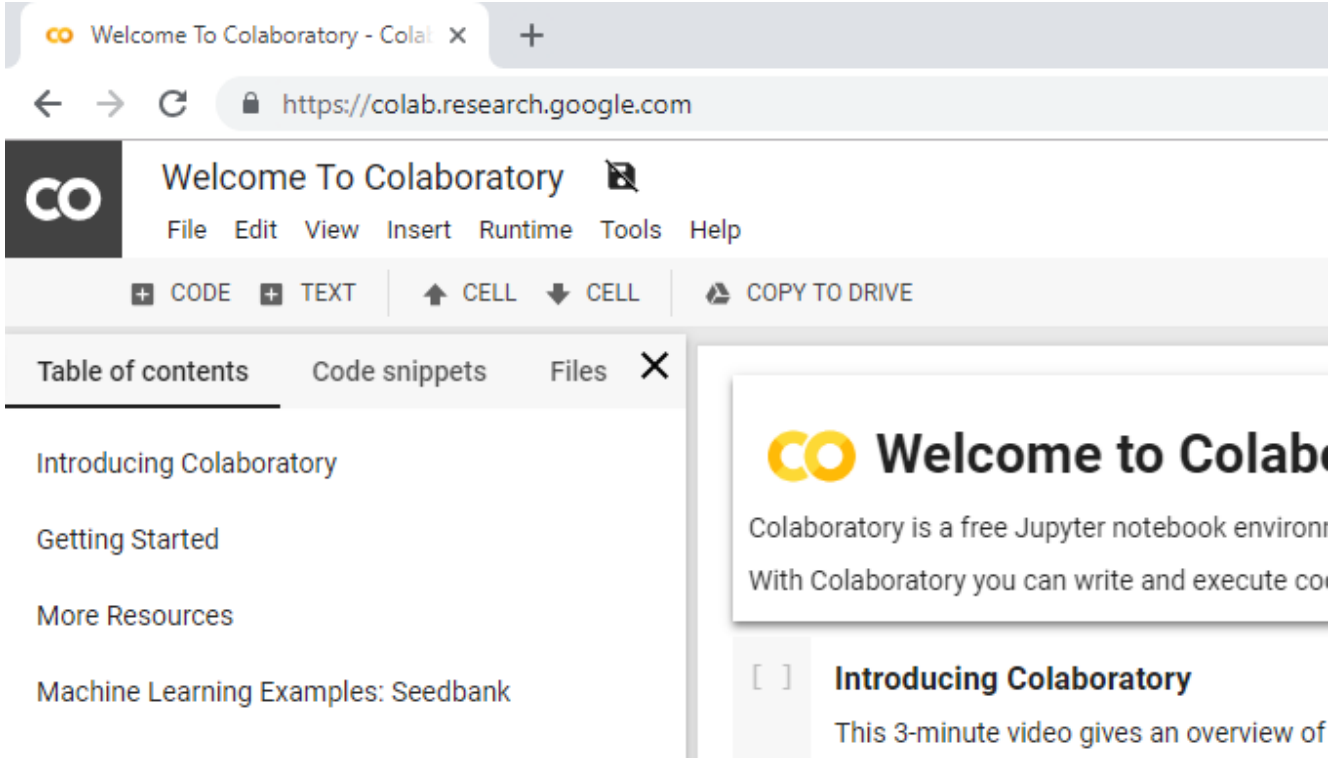
Online IDE - http://repl.it



It is important to check the Python Version. Some online IDE run Python version 2. **In this subject, we use Python version 3.**

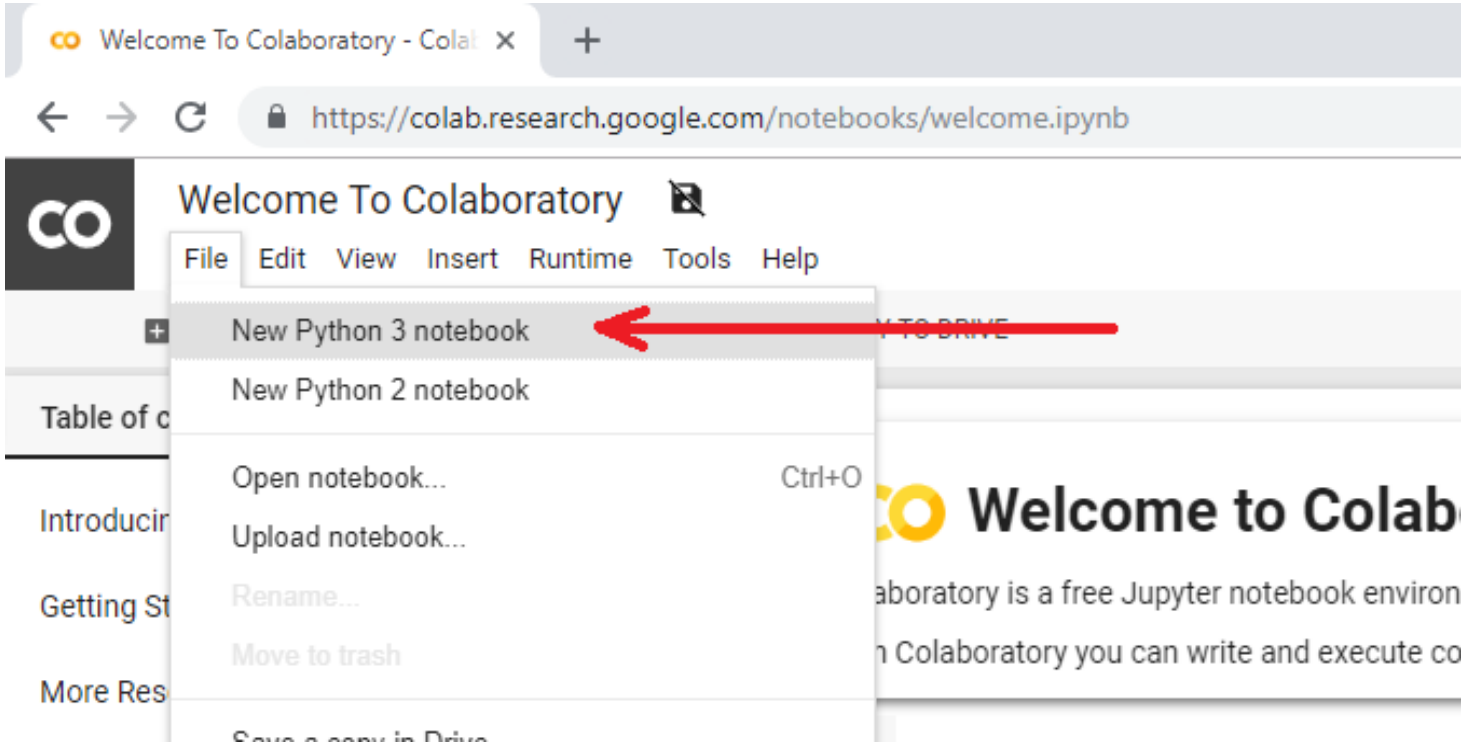
Online IDE – Google Colab

- https://colab.research.google.com
- All work can be saved on Google Drive



Online IDE – Google Colab

- https://colab.research.google.com
- All work can be saved on Google Drive
- To run new Python 3 file



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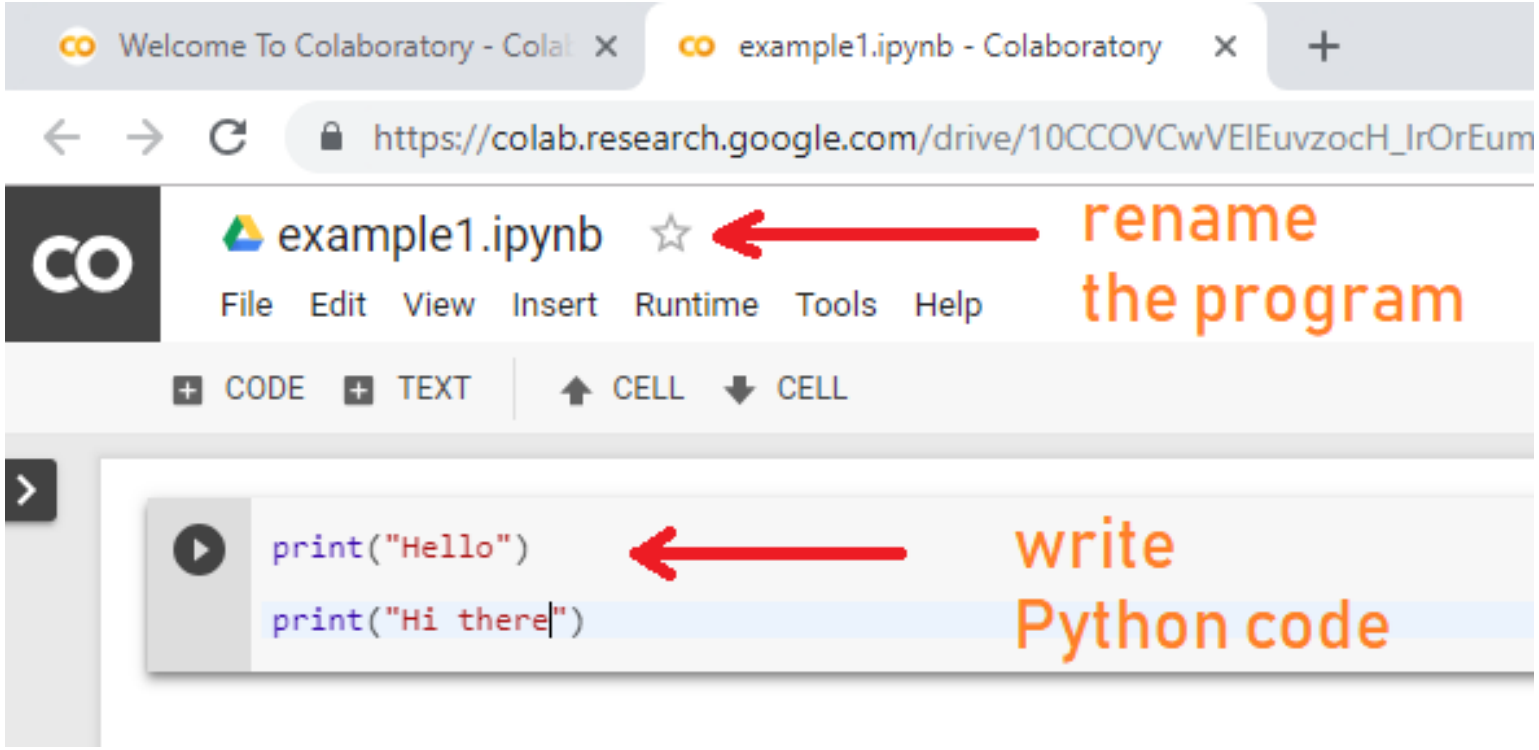

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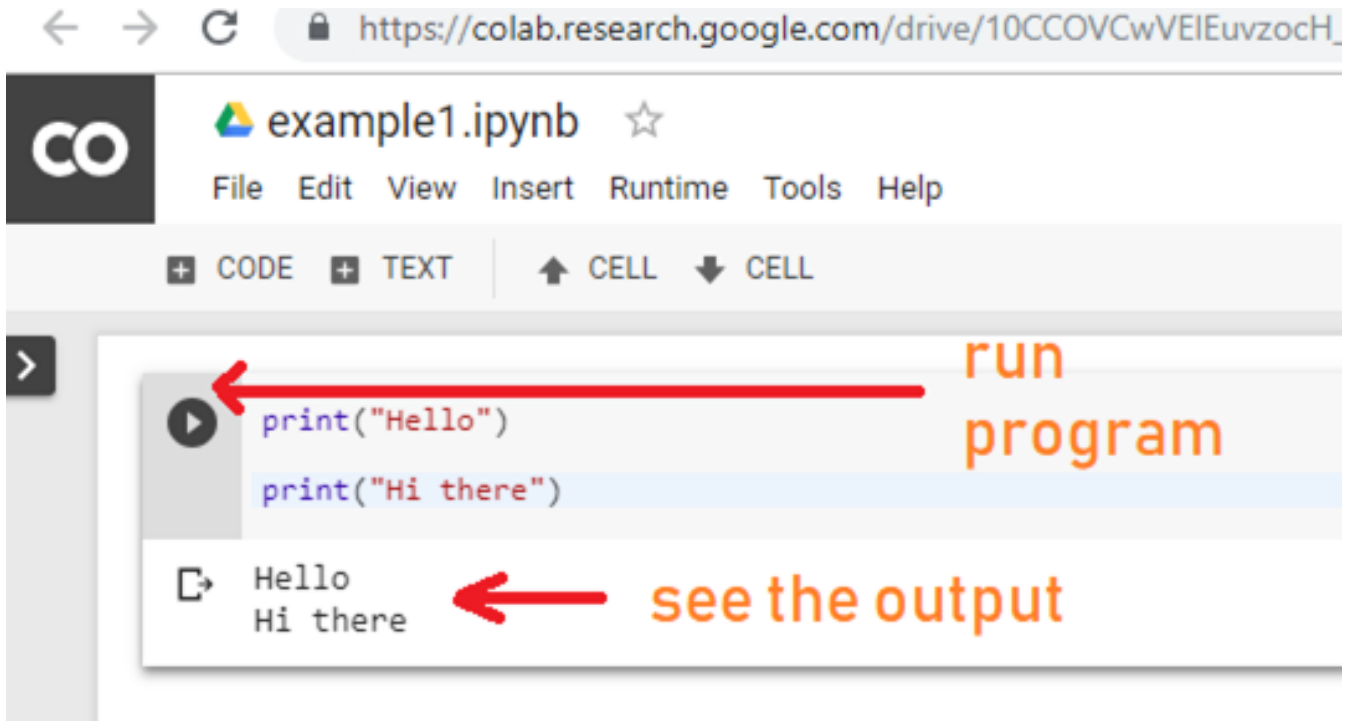
- Uses Jupyter Notebook style IDE



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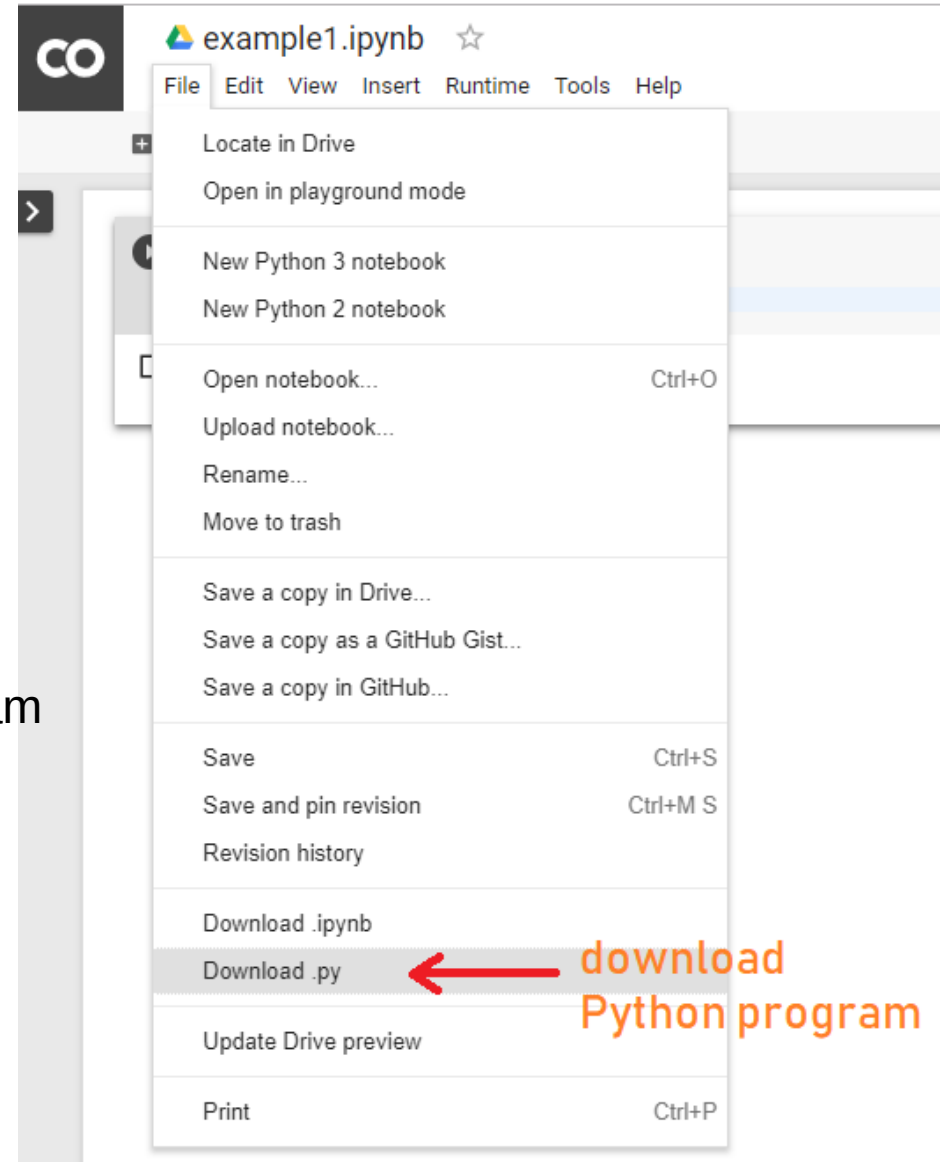
- Uses Jupyter Notebook style IDE

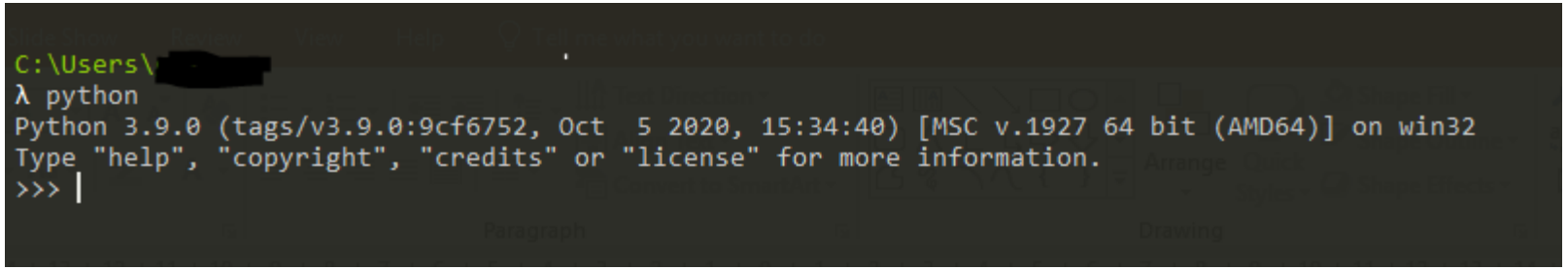
Download Python program



Running the Python interpreter (Extra)

Using the interpreter on other command line interfaces (CLI)

1. add the path to the python interpreter to your system's environment variable PATH
    - Default location for Windows: C:\Users\<username>\AppData\Local\Programs\Python\Python38-32\python.exe
    - https://opentechschool.github.io/python-beginners/en/getting_started.html
2. Type 'python' in your terminal or command prompt

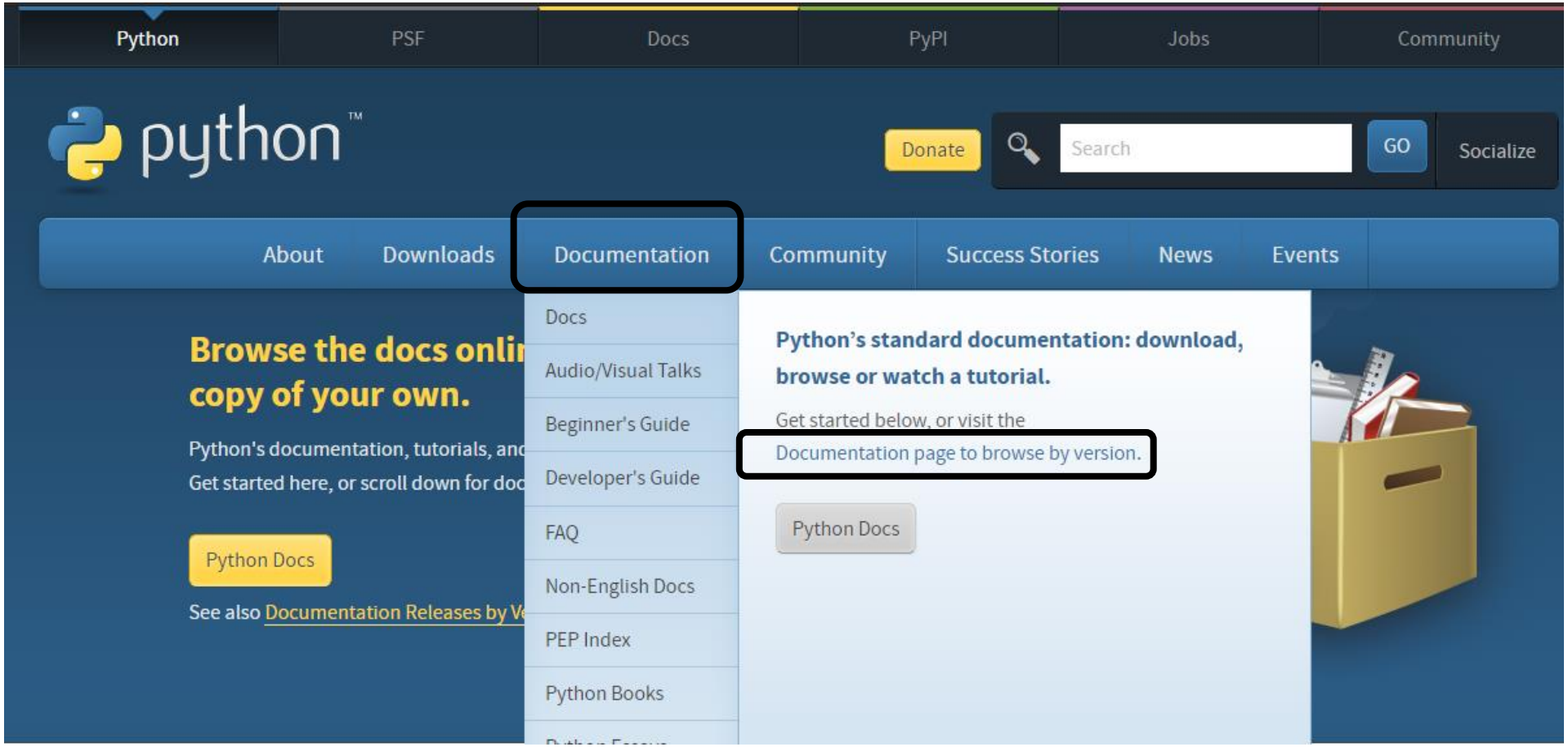


Online resources

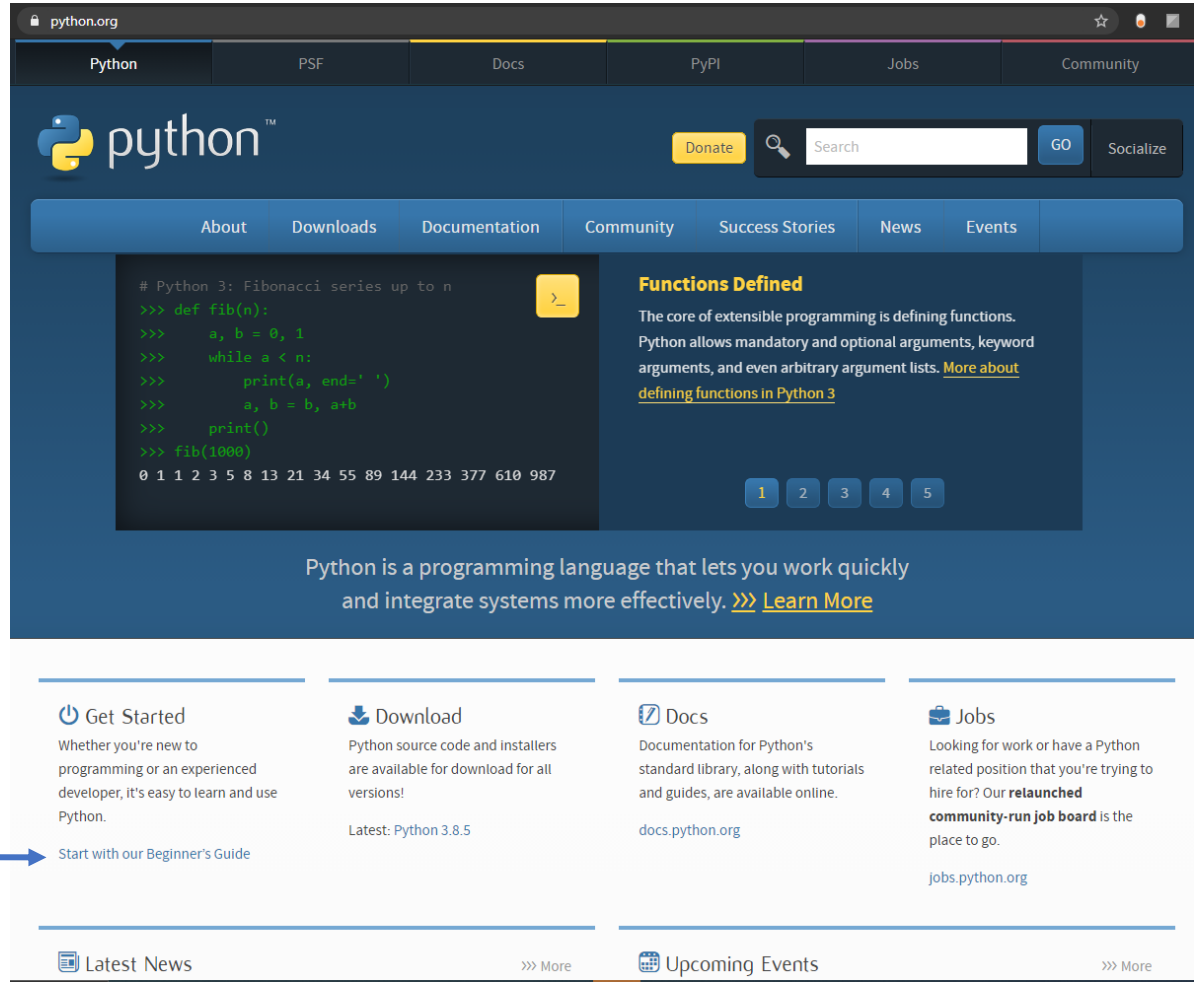
- There are many online tutorials on Python
- Try Google search or YouTube search on “python tutorial”

- Here are some useful links:
- http://www.python.org/about/gettingstarted
- http://docs.python.org/3/
- http://wiki.python.org/moin/BeginnersGuide/Programmers
- http://www.tutorialspoint.com/python3
- https://docs.python.org/3.8/tutorial/index.html

Documentation



Beginner's Guide



Finally,

- good programming skill - needs a lot of practice!

- so install **Python** and start coding as soon as possible