Python Introduction

Prof. Gheith Abandah

Outline

- The Python Programming Language
- Installing from python.org
- IPython and Jupyter Notebook
- Google Colab
- Anaconda – DS Toolkit
- Spyder IDE
- PyCharm IDE
- Python in Visual Studio
- Homework

The Python Programming Language

- YouTube Video from **Programming with Mosh**

What is Python? Why Python is So Popular?

https://youtu.be/Y8Tko2YC5hA

Introduction

- Python is an **interpreted**, **high-level**, **general-purpose** programming language.

- Created by Guido van Rossum and first released in **1991**.

- Python's design philosophy emphasizes **code readability**.

- Its language constructs and **object-oriented** approach aim to help programmers write **clear**, **logical** code for small and large-scale projects.

Features and Philosophy

- **Features**
  - Batteries Included
  - Everything is an Object
  - Interactive Shell
  - Cross Platform
- **Philosophy**
  - Beautiful is better than ugly
  - Explicit is better than implicit
  - Simple is better than complex
  - Complex is better than complicated
  - Readability counts

Python Resources

- **Official documentation**: https://docs.python.org

- **Tutorials**: https://www.learnpython.org/

- **Python Books**
  1. **A Whirlwind Tour of Python**, by Jake VanderPlas, https://www.oreilly.com/programming/free/files/a-whirlwind-tour-of-python.pdf (short)
  2. **Python for Everybody**, by Charles R. Severance, https://py4e.com/book.php (medium)
  3. **Fundamentals of Python Programming**, by Richard Halterman, http://python.cs.southern.edu/pythonbook/pythonbook.pdf (long)

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Installation from python.org

- Install Python 3 from https://www.python.org/downloads/

- The latest version in October 2020 is 3.9.0

- For using TensorFlow, you need a 64-bit Python version, e.g., https://www.python.org/ftp/python/3.9.0/python-3.9.0-amd64.exe

- For TensorFlow 1.6 and newer, your processor must support AVX (i3, i5, …). Otherwise use TensorFlow 1.5.

When installing Python, check the "Add to PATH" option
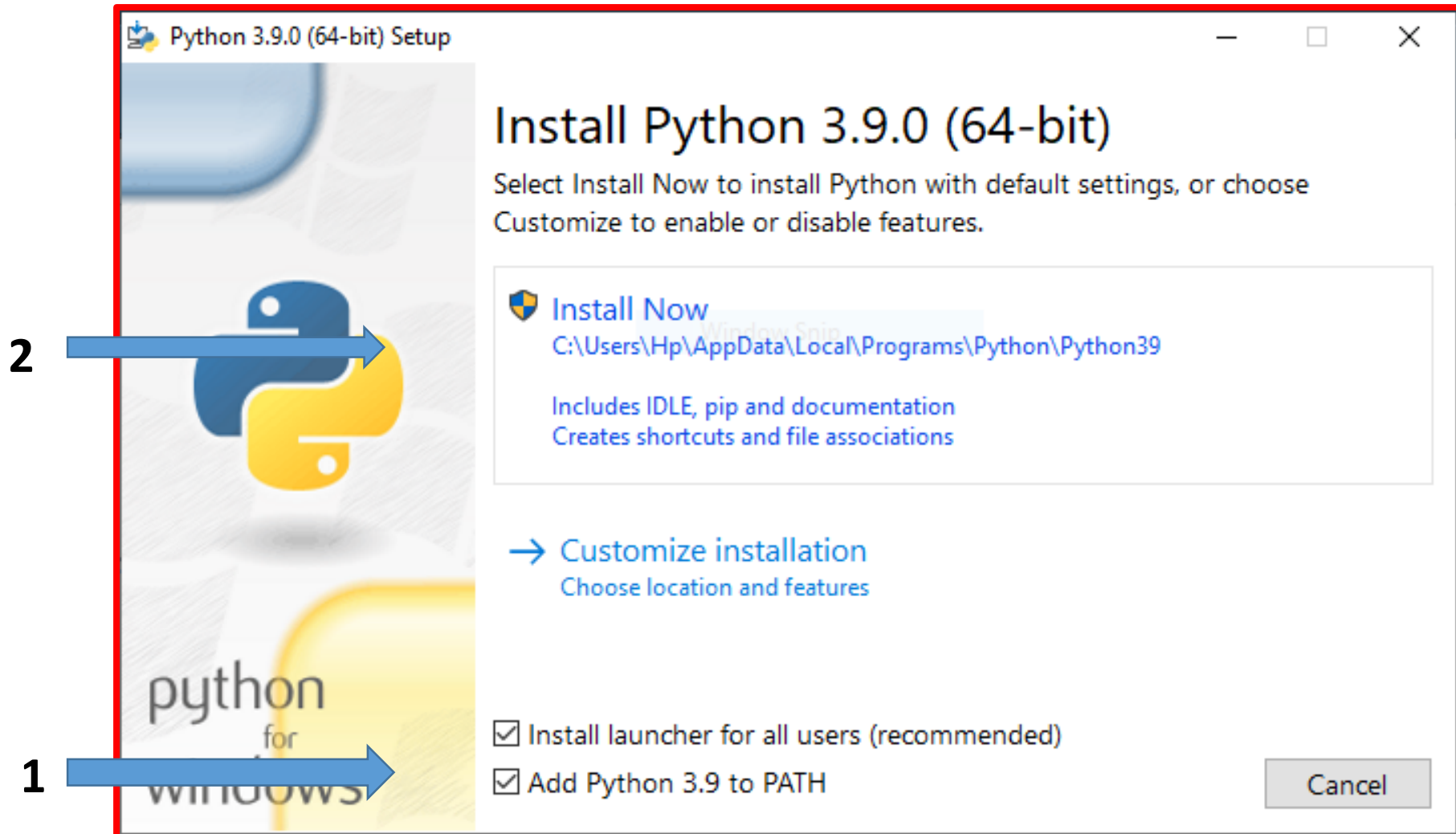
Installing Python Packages

- From your OS command prompt, check the **options** of the package installing system by:

  ```
  C:\>pip help
  ```

- **Check** the installed packages using:

  ```
  C:\>pip list
  ```

- **Install** needed packages through:

  ```
  C:\>pip install --upgrade jupyter matplotlib numpy pandas scipy scikit-learn
  ```

Executing Python Code

- **Starting** and using Python Interpreter

- **Creating** a Python script file

```python
# file: test.py
print("Running test.py")
x = 5
print("Result is", 3 * x)
```

- **Running** the script file

```
PS C:\Users\Hp> python
Python 3.9.0 (tags/v3.9.0:9cf6752, Oct  5 2020,
Type "help", "copyright", "credits" or "license
>>> x = 5
>>> print(3 * x)
15
>>> exit()
PS C:\Users\Hp>
```
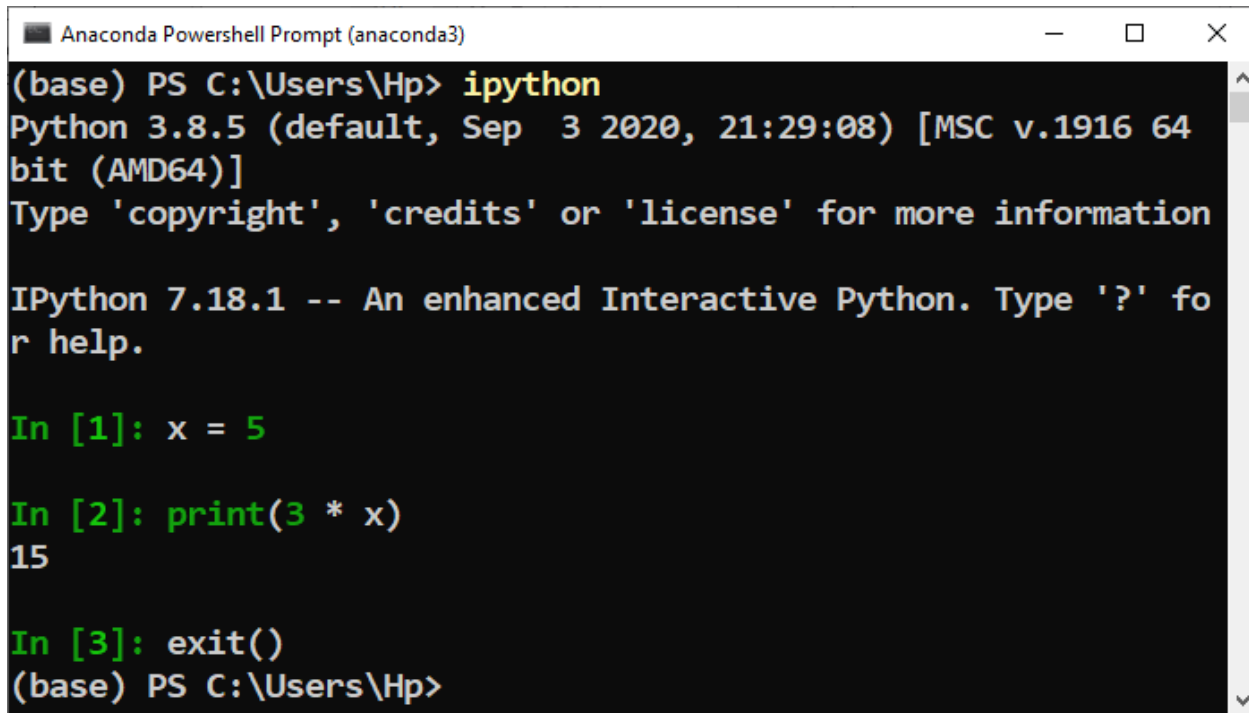
```
PS C:\Users\Hp> python test.py
Running test.py
Result is 15
PS C:\Users\Hp>
```

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IPython

- **Interactive Python shell**
- It provides a more useful shell environment to execute python code in REPL (Read Eval Print Loop).
- It makes it **more interactive** by adding features like:
  - **Syntax highlighting**
  - **Code completion**
  - **?, %run, %paste, %timeit, %reset**
- IPython also comes with other tools like **Jupyter Notebooks**.


```
Anaconda Powershell Prompt (anaconda3)                    —   □   ×

(base) PS C:\Users\Hp> ipython
Python 3.8.5 (default, Sep  3 2020, 21:29:08) [MSC v.1916 64
bit (AMD64)]
Type 'copyright', 'credits' or 'license' for more information

IPython 7.18.1 -- An enhanced Interactive Python. Type '?' fo
r help.

In [1]: x = 5

In [2]: print(3 * x)
15

In [3]: exit()
(base) PS C:\Users\Hp>
```

Jupyter Notebook

- The Jupyter Notebook is an open-source **web application** that allows you to create and share **documents** that contain live **code**, **equations**, **visualizations** and narrative **text**.

- **Website**: http://jupyter.org/

- **Tutorial** on Jupyter's website: https://jupyter-notebook.readthedocs.io/en/stable/notebook.html

Starting Jupyter Notebook

- To **start** Jupyter notebooks server from your OS command prompt enter:

  ```
  C:\>jupyter notebook
  ```

- Then **browse** to http://localhost:8888/.

15
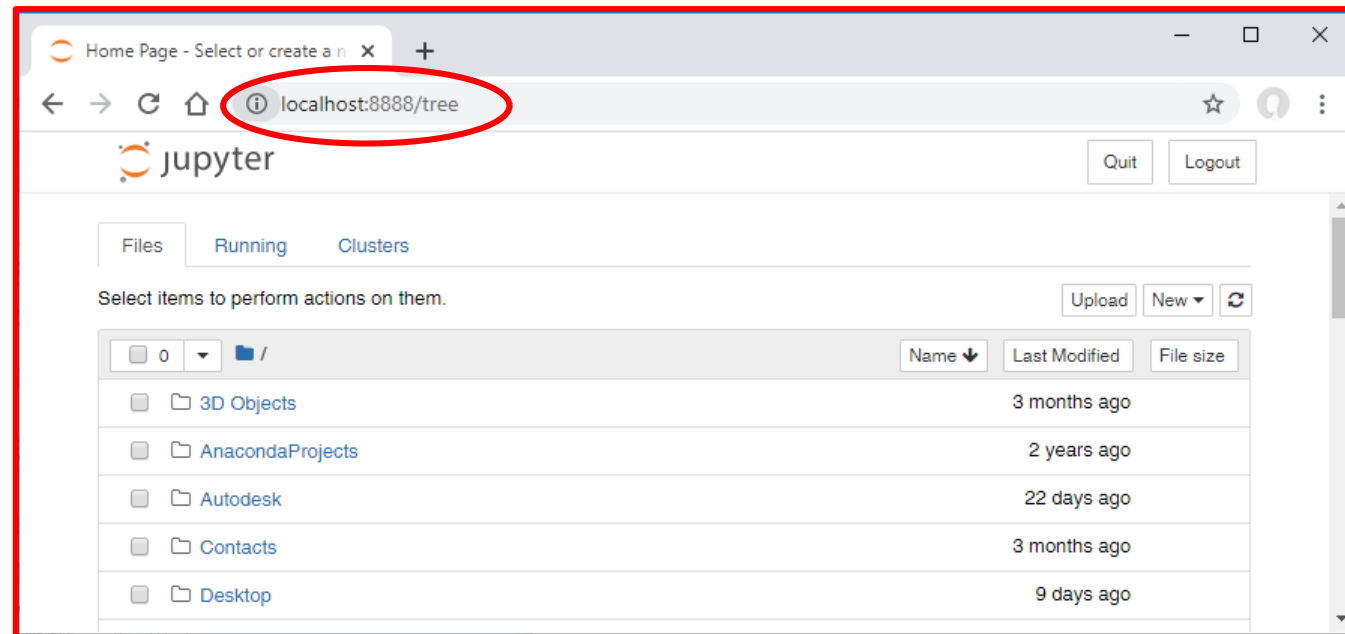
Creating Python Notebook

- Click on the New button and select the appropriate Python version.
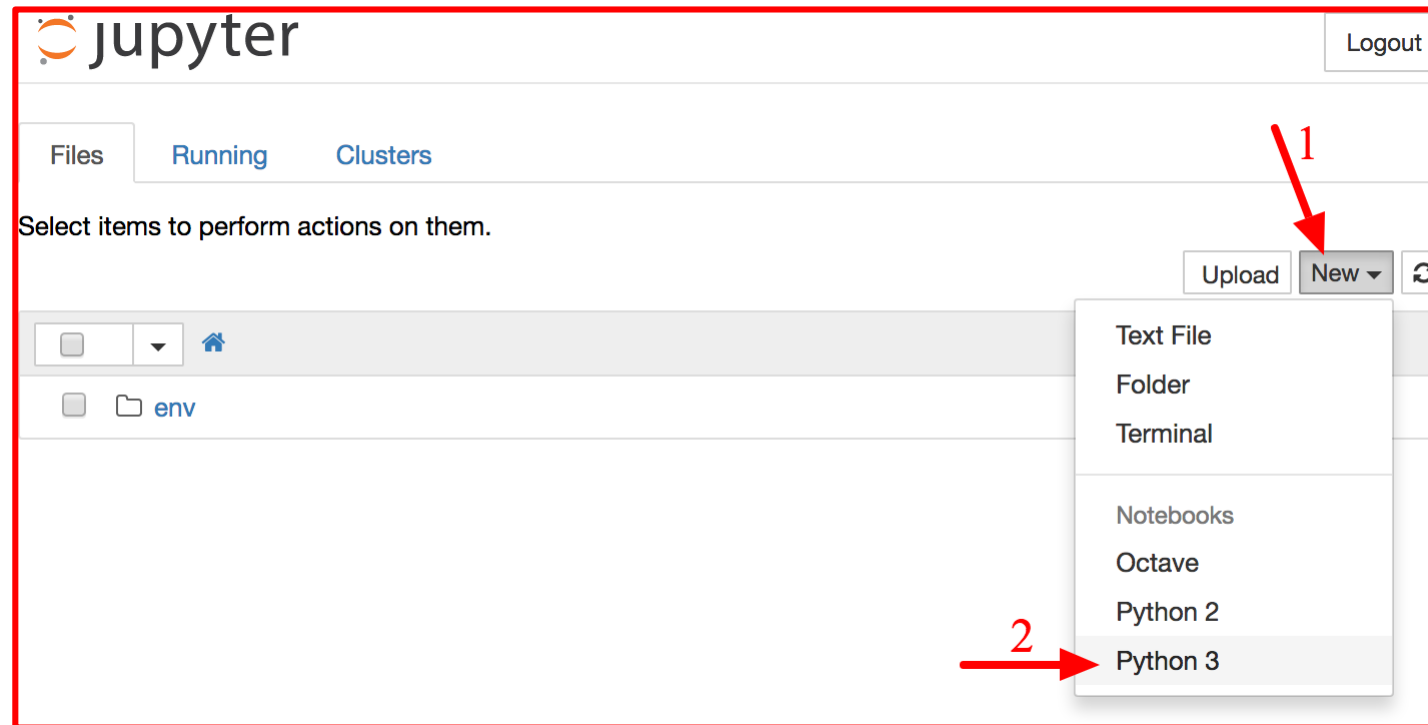
Working with Notebooks

- A notebook contains a list of **cells**. Each cell can contain executable **code** or formatted **text**.

- To change the notebook **name**, click on the title bar.

- Type `print("Hello world!")` in the first cell, and click on the **play** button. The result is displayed below the cell.

- Check the **User Interface Tour** from Jupyter's Help menu.
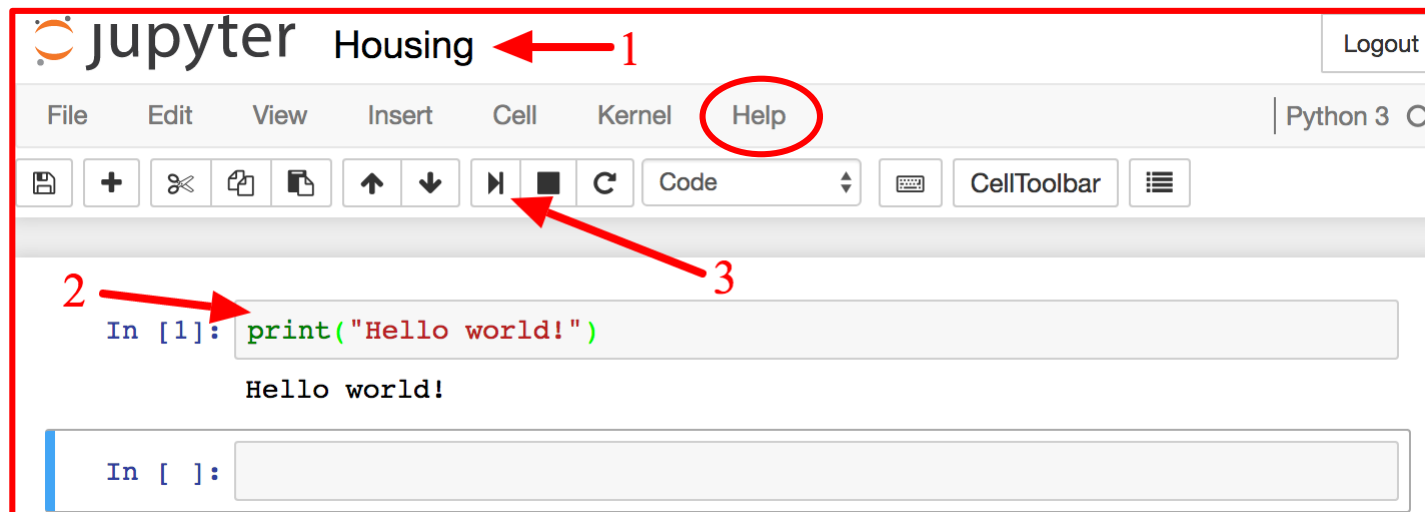
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Google Colab

- **Colaboratory** is a **free** Jupyter notebook environment that requires no setup and runs entirely in the **cloud**.
With **Colaboratory** you can write and execute code, save and share your analyses, and access powerful **computing resources**, all for free from your browser.

  https://colab.research.google.com/

- Check the **introduction** in
https://colab.research.google.com/notebooks/intro.ipynb#

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Anaconda – DS Toolkit

- **The recommended toolkit**
  - Download packages
  - Manage environments
  - Access Python applications and help
- **Install** the 64-bit version
  - https://www.anaconda.com/products/individual
- **Tutorial**
  - https://www.anaconda.com/individual-tutorial

Conda from the Powershell

Anaconda Navigator

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Spyder IDE

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PyCharm IDE

- **PyCharm** is a powerful Python IDE. Install it from https://www.jetbrains.com/pycharm/

- Install the free **Community** version.

- Students can also install the **Professional** version for free. You need university email address.

- Read the first two steps of **First Steps** at https://www.jetbrains.com/help/pycharm/first-steps.html

PyCharm Installation

Select

Select this

PyCharm Installation

- Check the following **tutorial** to learn how to **connect PyCham** to an **Conda environment**:
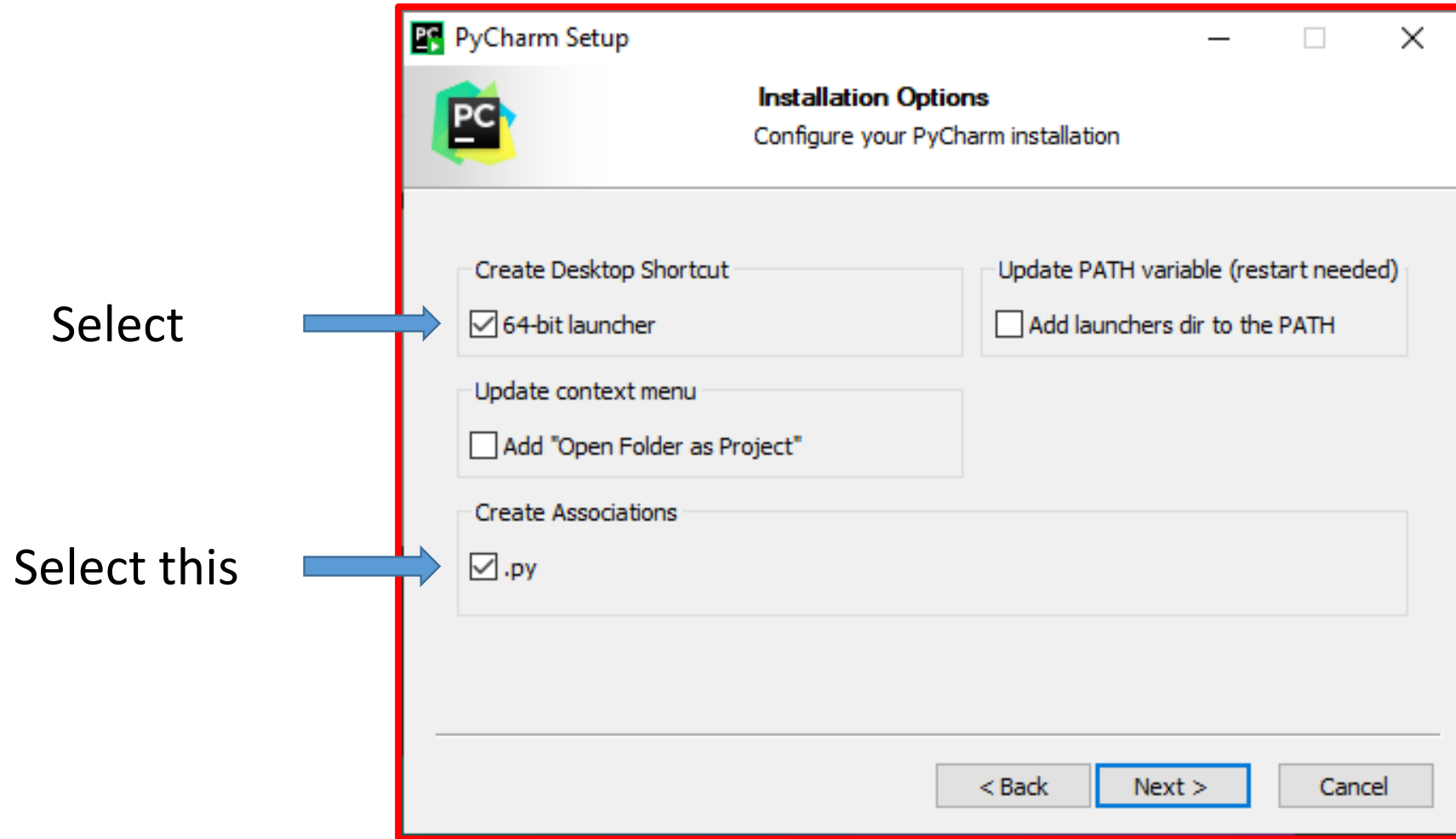 - https://docs.anaconda.com/anaconda/user-guide/tasks/pycharm/

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1. Start Visual Studio and select Create a new project
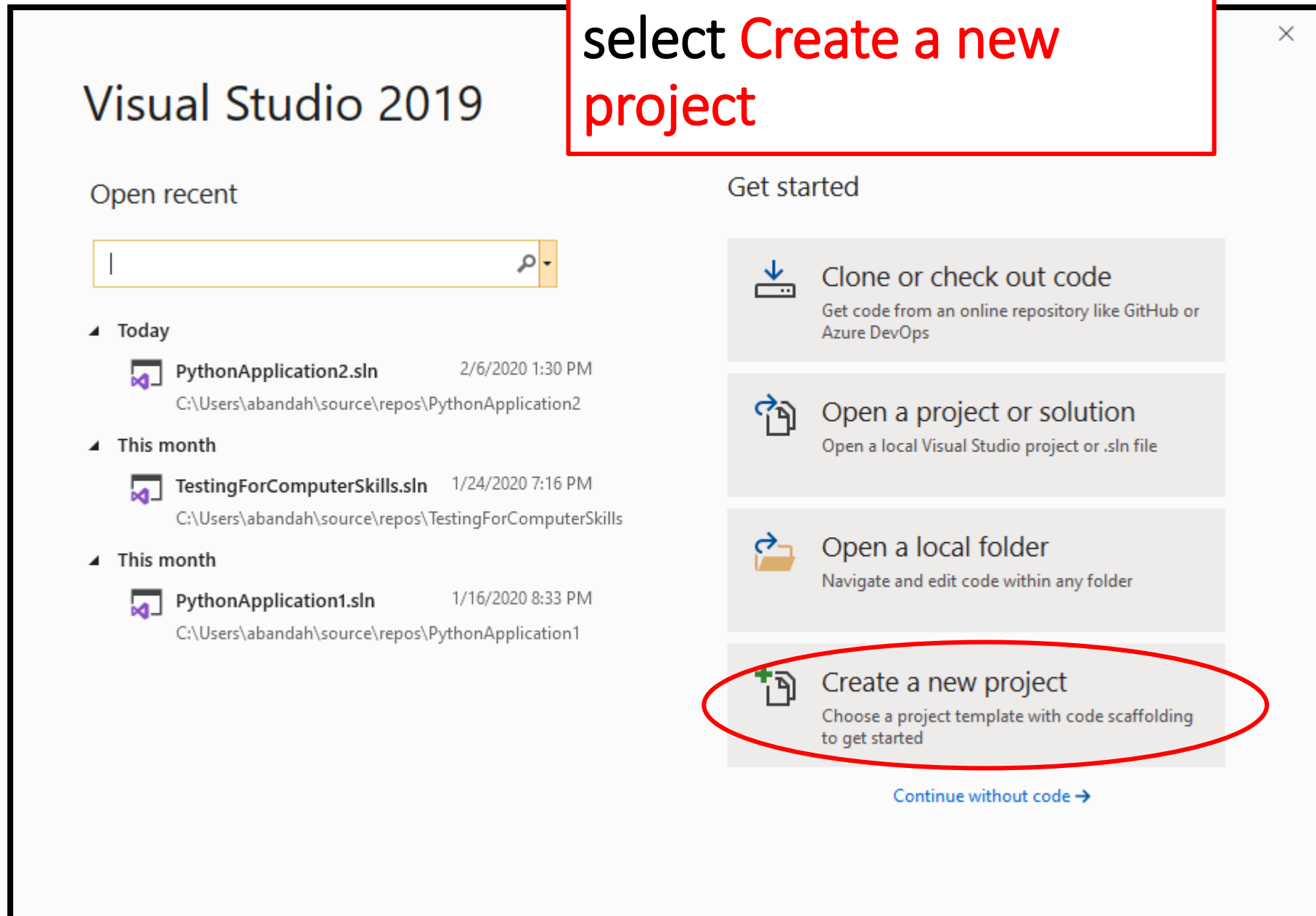
2. Select the language Python and Python Application, then click Next.

Create a new project

Search for templates (Alt+S) 🔍

Clear all

Recent project templates

Python | All platforms | All project types

PY Python Application
A project for creating a command-line application
Python | Windows | Linux | macOS | Console

📐 Python
Application | Python

C++ Console App | C++

PY Web Project
A project for creating a generic Python web project
Python | Windows | Linux | macOS | Web

PY Django Web Project
A project for creating an application using the Django web framework. It features sample pages that use the Twitter Bootstrap framework for responsive web design.
Python | Windows | Linux | macOS | Web

PY Flask Web Project
A project for creating an application using the Flask web framework with the Jinja template engine. It features sample pages that use the Twitter Bootstrap framework for responsive web design.
Python | Windows | Linux | macOS | Web

Back | Next

3. Enter a name for your project then press Create.

Configure your new project

Python Application   Python   Windows   Linux   macOS   Console

Project name

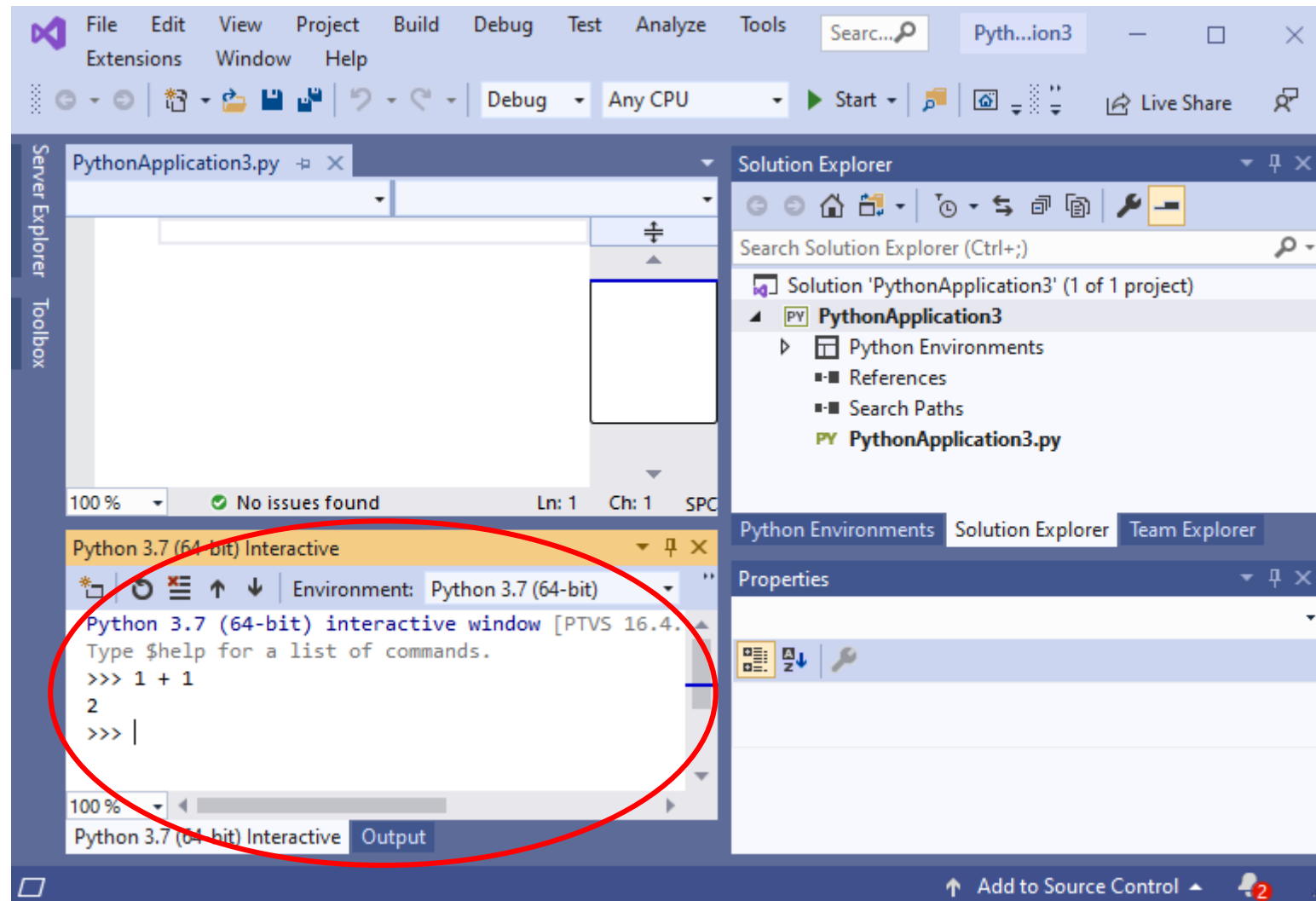PythonApplication3

Location

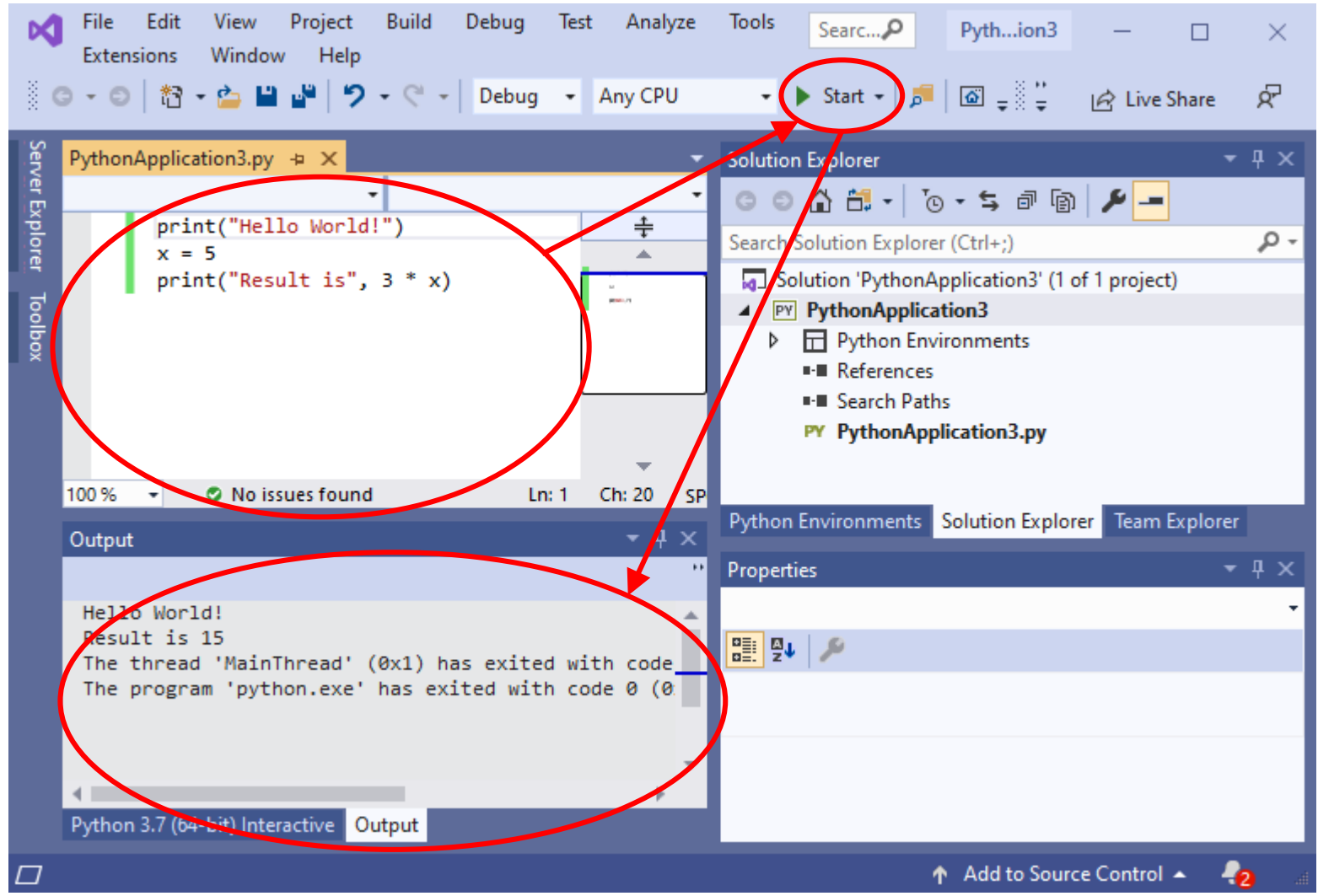C:\Users\abandah\source\repos

Solution name ⓘ

PythonApplication3

☑ Place solution and project in the same directory

Back   Create
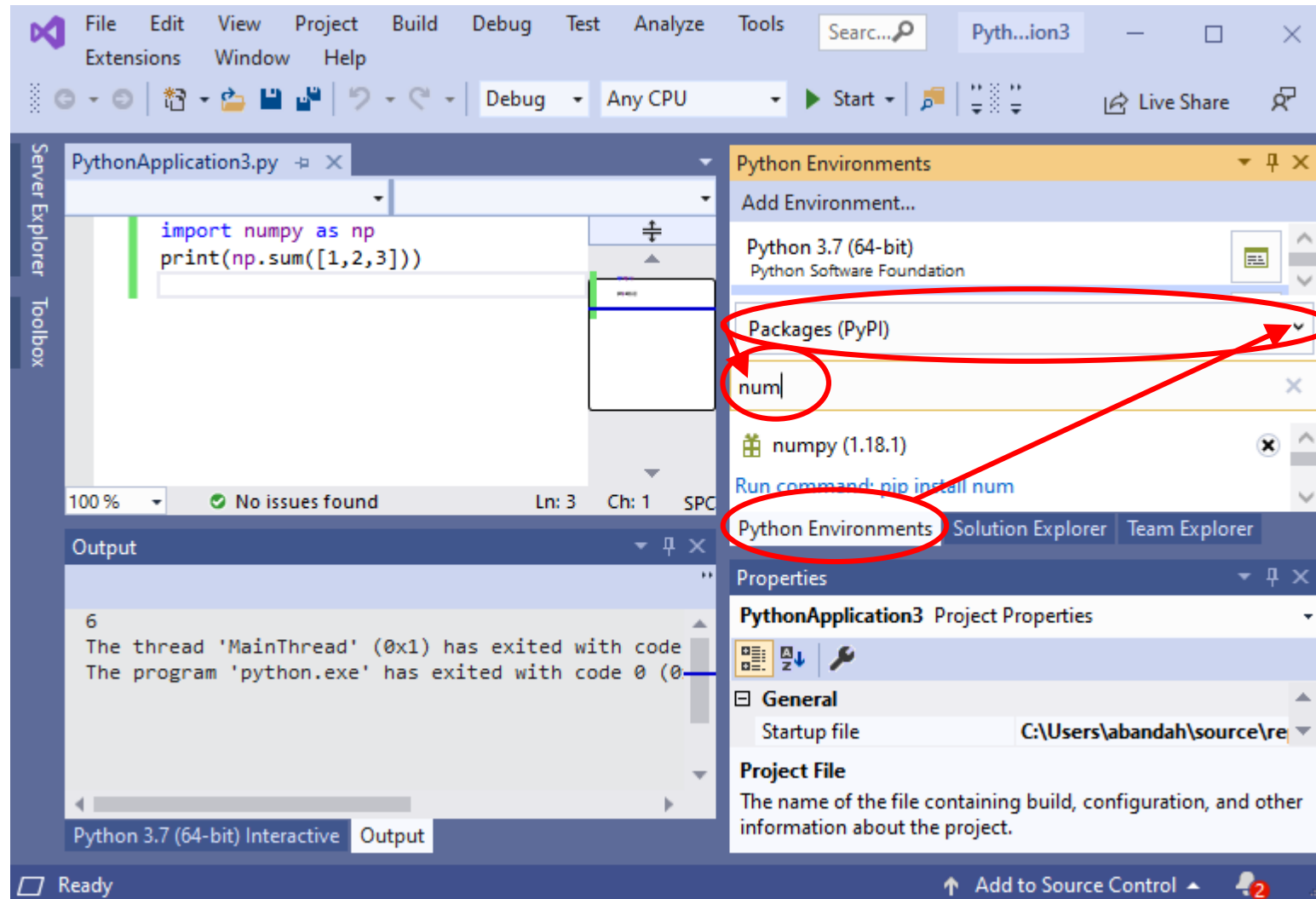
33

4. You can directly enter and run Python code in the Python Interactive window.

5. You can enter your Python program in the Editor window and execute it by clicking Start. The output appears in the Output window.

6. To install or list packages, select the Python Environments and Packages (PyPI), then enter the name of the package in the search box.

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Homework

1. **Read** all **tutorials** suggested in this presentation.
2. **Install Anaconda**.
3. Open Anaconda prompt and **update** it.
4. From Anaconda prompt, **execute** a Python **script file**.
5. From Anaconda Navigator, launch **Jupyter Notebook** and experiment with entering and executing code and text cells.
6. Create a new **Conda environment** and install in it the package **numpy**.
7. Install **PyCharm** and create a **new project** that uses the created Conda environment and **execute** the following code:

```python
import numpy as np
a= np.random.random(10)
print(a)
```

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