

Important Python Packages

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Outline

- Exercises
- NumPy
- Pandas
- Matplotlib
- Jupyter notebooks

Exercises from

<http://www.practicepython.org/>

- Ex1: Create a program that asks the user to enter their name and their age. Print out a message addressed to them that tells them the year that they will turn 100 years old.
- Ex3: Take a list, say for example this one: `a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89]` and write a program that prints out all the elements of the list that are less than 5.
- Ex5: Take two lists, say for example these two: `a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89]` and `b = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13]` and write a program that returns a list that contains only the elements that are common between the lists (without duplicates). Make sure your program works on two lists of different sizes.
- Ex28: Implement a function that takes as input three variables, and returns the largest of the three. Do this without using the Python `max()` function!

Exercises from

<https://www.w3resource.com/python-exercises/>

- Class 9: Write a Python class which has two methods `get_String` and `print_String`. `get_String` accept a string from the user and `print_String` print the string in upper case.
- Class 10: Write a Python class named `Rectangle` constructed by a length and width and a method which will compute the area of a rectangle.

NumPy

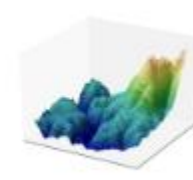
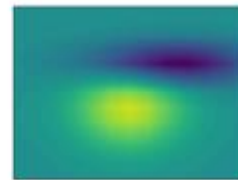
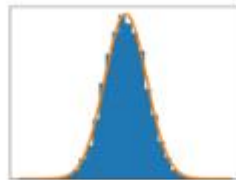
- NumPy is the fundamental package for fast scientific computing with Python. It contains:
 - A powerful N-dimensional array object
 - Sophisticated (broadcasting) functions
 - Tools for integrating C/C++ and Fortran code
 - Useful linear algebra, Fourier transform, and random number capabilities
- Website: <http://www.numpy.org/>
- Also, check the tutorial on Learn Python: https://www.learnpython.org/en/Numpy_Arrays

Pandas

- Pandas is high-performance, easy-to-use data structures and data analysis tools. It contains:
 - A set of labeled array data structures (Series and DataFrame)
 - Index objects enabling both simple axis indexing and multi-level / hierarchical axis indexing
 - Input/Output tools: loading tabular data from flat files (CSV, delimited, Excel 2003), and saving and loading pandas objects
- Website: <https://pandas.pydata.org/>
- Also, check the tutorial on Learn Python: [https://www.learnpython.org/en/Pandas Basics](https://www.learnpython.org/en/Pandas_Basics)

Matplotlib

- Matplotlib is a Python plotting library which produces publication quality figures in a variety of hardcopy formats.



- Website: <https://matplotlib.org/>
- Also, check the tutorial in the Intermediate Python on DataCamp: <https://www.datacamp.com/courses>

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/>

- From your OS command prompt, start it by:

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

- The textbook explains how to use Jupyter to run the examples in Chapter 2.

Exercises from

<https://www.w3resource.com/python-exercises/>

- **NumPy 3:** Create a 3x3 matrix with values ranging from 2 to 10.
- **NumPy 73:** Write a Python program to create an array of (3, 4) shape, multiply every element value by 3 and display the new array.
- **Pandas DataFrame 4 and 5:** Write a Python program to get the first 3 rows and the 'name' and 'score' columns from the following DataFrame.

Sample Python dictionary data and list labels:

```
exam_data = {'name': ['Anastasia', 'Dima', 'Katherine',  
                    'James', 'Emily', 'Michael', 'Matthew', 'Laura', 'Kevin',  
                    'Jonas'],  
            'score': [12.5, 9, 16.5, np.nan, 9, 20, 14.5, np.nan, 8,  
                    19],  
            'attempts': [1, 3, 2, 3, 2, 3, 1, 1, 2, 1],  
            'qualify': ['yes', 'no', 'yes', 'no', 'no', 'yes', 'yes',  
                    'no', 'no', 'yes']}  
labels = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j']
```