Python Tutorial 1 Exercises

January 18, 2022

This is the exercise of "Python Tutorial 1" for Prof. Xin Tong's DSO 530 class at the University of Southern California in spring 2022.

1. Write a Python function to find the Max of three numbers.

hint: You could write a Python function to find the Max of two numbers, then write a new function using the first function to find the Max of three numbers.

Test Code:

print(max_of_three(3, 6, -5))

the created Python function by you named *max_of_three*

2. What's the difference between *np.zeros* and *np.empty*?

3. Write a NumPy program to multiply a 5x3 matrix by a 3x2 matrix and create a real matrix product.

Requirement:

Use np.random.randn to generate the 5x3 matrix and the 3x2 matrix.

Set the random seed to 15 before generating the matrices: *np.random.seed(15)*.

4. Read the code and answer the following questions:

[1]:
```
import numpy as np
arr1 = np.arange(27).reshape(3,3,3)
arr2 = arr1[1].copy()
arr2[2] = 50
```

What's the output of *arr1[2,0]* and *arr2[2,0]*?

5. Read the code and answer the following questions:

[2]:
```
import numpy as np
arr1 = np.array([[1,21,3,22,5],[23,7,24,9,25],[11,26,27,28,15]])
arr1
```

[2]:
```
array([[ 1, 21,  3, 22,  5],
       [23,  7, 24,  9, 25],
       [11, 26, 27, 28, 15]])
```

(1) Get array *arr2* transformed from *arr1* with only one line of code:

[3]:
```
arr2 = np.array([[21,22,23,24],[25,26,27,28,]])
arr2
```

[3]:
```
array([[21, 22, 23, 24],
       [25, 26, 27, 28]])
```

(2) What's the output of *arr2[-1,-2]*?

6. Write a NumPy program to complete the following functions:

(1)Create an array 0-19 of 4,5 shape and print it

(2)Swap axis0 with axis1 and print it

(2)Swap swap column1 with column4 and print it

7. Write a NumPy program generate 50 random numbers from N(2,3)(the normal distribution with mean 2 and variance 3) and compute their mean and variance.

Requirements:

Write the program two times:

for the first time, set seed to 1 and for the second time, set seed to 2.

See the difference between the two results.