

Capsule 3 – Do it Yourself

Q1. Write a Python program to initialize a 3x3 NumPy array with any integer values of your choice. Then, perform the following operations:

- **Multiply the entire array by 2.**
- **Add 5 to each element of the array.**
- **Calculate the square of each element in the array.**
- **Print the original array and the results of each operation.**

```
import numpy as np  
ori_arr = np.array([[1,2,3], [4,5,6], [7,8,9]])  
print(ori_arr)
```

```
multiple_arr = ori_arr * 2  
print(arr)
```

```
add_arr = ori_arr + 5  
print(add_arr)
```

```
sq_arr = np.square(ori_arr)  
print(sq_arr)
```

Q2. Write a Python program to initialize a 3x3 NumPy array with any integer values of your choice. Then, perform the following slicing operations:

- **Extract the first row of the array.**
- **Extract the last column of the array.**
- **Extract a 2x2 sub-array from the center of the original array.**

```
import numpy as np
```

```
ori_arr = np.array([[1,2,3], [4,5,6], [7,8,9]])
```

```
print(ori_arr)
```

```
print(ori_arr[0, :])
```

```
print(ori_arr[:, -1])
```

```
print(ori_arr[1:, 1:])
```

Q3. Write a program to create a DataFrame in Python to store the names and marks of 10 students. Each row of the DataFrame should represent a student, with columns as 'Name' and 'Marks'. Populate the DataFrame with appropriate data and then print it.

```
import pandas as pd
```

```
data = {  
    'Name': ['Alice', 'Bob', 'Charlie', 'David', 'Emma', 'Frank', 'Grace', 'Hannah', 'Ian', 'Jack'],  
    'Marks': [85, 90, 78, 88, 92, 76, 89, 95, 80, 87]  
}
```

```
df = pd.DataFrame(data)
```

```
print(df)
```

Q4. Write a python program to create a DataFrame representing the names and income of 5 employees. The DataFrame should include columns 'Employee_name' and 'Income', and each row should correspond to an individual employee. Use the indices 'a', 'b', 'c', 'd', and 'e' for the DataFrame entries to uniquely identify each employee.

```
import pandas as pd
```

```
data = {  
    'Employee_name': ['John', 'Sarah', 'Michael', 'Emma', 'David'],  
    'Income': [50000, 60000, 55000, 62000, 58000]  
}
```

```
df = pd.DataFrame(data, index=['a', 'b', 'c', 'd', 'e'])
```

```
print(df)
```

Q5. Imagine you're tasked with visualizing data using Python. You have the following dataset representing the frequency of occurrences for categories A, B, C, D, and E, stored in two lists:

```
x = ['A', 'B', 'C', 'D', 'E']
```

```
y = [10, 20, 15, 25, 30]
```

Write a Python script that creates a bar plot to visualize this data. The categories A, B, C, D, and E should be displayed on the x-axis, while the corresponding frequencies should be displayed on the y-axis.

```
import matplotlib.pyplot as plt
```

```
x = ['A', 'B', 'C', 'D', 'E']
```

```
y = [10, 20, 15, 25, 30]
```

```
plt.bar(x,y, color='blue')
```

```
plt.show()
```