

# **National University of Computer and Emerging Sciences**



## **Lab Exercise 04**

### **DL2001-Introduction to Data Science Lab**

|                   |                  |
|-------------------|------------------|
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| Section           | BDS-3A           |
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## Exercise

1. Array Creation:
  - a. Create a 1D NumPy array of numbers from 0 to 9.
  - b. Create a 3x3 NumPy array of all zeros.
  - c. Create a 4x4 identity matrix.
  - d. Create an array of 10 numbers between 0 and 1 (inclusive).
2. Array Inspection
  - a. Create a 2D array and print its shape and data type.
  - b. Check how many dimensions it has.
  - c. Get the size (total number of elements).
3. Use the given array to answer the questions below:

```
arr = np.array([[10, 20, 30], [40, 50, 60], [70, 80, 90]])
```

- a. Slice the middle element (50).
- b. Get the last column.
- c. Get the first two rows.
- d. Return all the values greater than 50

4. Use the given arrays to answer the questions below:

```
a = np.array([1, 2, 3])
b = np.array([4, 5, 6])
```

- a. Add a and b.
  - b. Multiply a and b element-wise.
  - c. Calculate the dot product of a and b.
  - d. Find the mean and standard deviation of b.
5. Given two numpy arrays A and B, apply the formula given below

$$Z = \frac{A^2 + \sin(B)}{\sqrt{|A - B| + 1}}$$

6. Run the code given below and explain its output in 2-3 lines.

```
import numpy as np

arr = np.random.randint(-50, 151, size=100)

arr_reshaped = arr.reshape((10, 10))

arr_reshaped[arr_reshaped < 0] = 0

arr_min = arr_reshaped.min()
arr_max = arr_reshaped.max()
normalized = (arr_reshaped - arr_min) / (arr_max - arr_min)

row_means = normalized.mean(axis=1)

print("Original reshaped array (negatives replaced):\n", arr_reshaped)
print("\nNormalized array:\n", normalized)
print("\nRow-wise means:\n", row_means)
```

7. You have a flattened array of 12 elements:

```
arr = np.arange(1, 13)
```

- a. Reshape it to a 3x4 matrix.
- b. Compute the standard deviation across rows.
- c. Compute the standard deviation across columns.

8. Create a Pandas Series from a list: [10, 20, 30, 40, 50].

9. Create a DataFrame with the following data:

| Name  | Age | City    |
|-------|-----|---------|
| Alice | 25  | Lahore  |
| Bob   | 30  | Karachi |

|         |    |        |
|---------|----|--------|
| Charlie | 35 | Lahore |
|---------|----|--------|

- a. Use `.head()` and `.tail()` to view the first and last rows of a DataFrame.
- b. Display the number of rows and columns in a DataFrame.
- c. Show the data types of each column.
- d. From the above DataFrame, select the "Name" column.
- e. Select the row where Name == "Bob".
- f. Select the value in the 2nd row and 3rd column (use `.iloc`).
- g. Select all rows where Age > 28.
- h. Add a new column called "Score" with values [85, 90, 95].
- i. Change the "City" of "Charlie" to "Multan".
- j. Delete the "Score" column.
- k. Find the average age of all people.
- l. Count how many unique cities are in the "City" column.
- m. Use `.describe()` to get a statistical summary of the numeric columns.