Python Assignment: Data Structures, Functions, Numpy & Pandas

# Instructions

• Attempt all questions.  
• Submit the completed assignment in .ipynb format.  
• Use appropriate function definitions and comments for clarity.

# Assignment Questions

## Section A: Data Structures & Control Structures

1. Create a list of 5 integers. Perform and print the result of the following operations: **append, extend, insert, remove, pop, clear, index, count, sort,** and **reverse**.
2. Create a tuple that stores 3 student names. Try changing the second name in the tuple. What happens? Explain why.
3. Create a set of integers with some duplicate values. Print the set and explain the output.
4. Create a dictionary with the keys: 'name', 'age', and 'city'. Update the age and add a new key 'email'. Print the final dictionary.
5. Write a script that checks if a person is eligible to vote (age ≥ 18). Take age as a variable and print the appropriate message.
6. Given a 'marks' variable, print the grade:  
   - 90 and above: 'A'  
   - 75–89: 'B'  
   - 50–74: 'C'  
   - Below 50: 'Fail'
7. Given a number, check if it's positive, and if it is also even. If not positive, print if it's zero or negative.

## Section B: Numpy

1. Create:  
   - A scalar using np.array(5)  
   - A 1D array with values 1 to 5  
   - A 2D array (2x3) with values from 10 to 60 in steps of 10
2. Generate a 4x4 Numpy array of random integers between 0 and 100 using np.random.randint().
3. Create a 2D numpy array of shape (3x3). Convert it into a pandas DataFrame and add column names: 'A', 'B', 'C'.

## Section C: Exploring Pandas

1. Create a small DataFrame manually with 10 rows and columns: 'Name', 'Age', 'City', and 'Salary'. Then:  
   - Use .info(), .describe()  
   - Select 'Name' and 'City' columns  
   - Drop 'City' column  
   - Fill any missing values in 'Salary' column with the mean  
   - Remove any duplicate rows