### **Pandas Programming Questions**

1. **DataFrame Creation and Inspection**:
   * Create a pandas DataFrame using the following data:  
     python

data = {'Name': ['Alice', 'Bob', 'Charlie', 'David'],

'Age': [25, 30, 35, 40],

'City': ['New York', 'Los Angeles', 'Chicago', 'Houston']}

* Display the first two rows of the DataFrame.
* Check the data types of each column.

**Filtering Data**:

* Given the following DataFrame:

df = pd.DataFrame({ 'Student': ['John', 'Anna', 'Peter', 'Linda', 'James'], 'Score': [85, 92, 78, 90, 88], 'Passed': [True, True, False, True, True] })

* Filter and display only the rows where students passed with a score greater than 85.

**Handling Missing Data**:

* Create a DataFrame from the following data:

data = {'Name': ['Tom', 'Jerry', 'Mickey', None], 'Score': [88, None, 79, 85]}

* Fill the missing values in the 'Score' column with the mean score.
* Drop any rows where the 'Name' column has missing data.

**GroupBy and Aggregation**:

* Given the DataFrame below, group the data by 'Department' and calculate the average 'Salary':

df = pd.DataFrame({ 'Name': ['Alice', 'Bob', 'Charlie', 'David', 'Eve'], 'Department': ['HR', 'IT', 'HR', 'IT', 'Finance'], 'Salary': [70000, 80000, 65000, 90000, 75000] })

**Datetime Conversion**:

* Create a DataFrame with a 'Date' column containing the following dates as strings: ['2023-01-01', '2023-02-01', '2023-03-01'].
* Convert the 'Date' column to datetime format.
* Extract and display the month and year from the 'Date' column.

**Time Series Resampling**:

* Create a time series DataFrame with daily data for January 2023 using a range of integers as values.
* Resample the data to show weekly averages.

**EDA on a Dataset**:

* Load a dataset of your choice (e.g., Titanic, Iris) using pandas.
* Perform the following analyses:
  + Summary statistics of numerical columns.
  + Distribution of a specific column using a histogram.
  + Box plot to detect outliers in one of the numerical columns.
  + Correlation matrix to understand relationships between numerical variables.

NUmpy

**Array Creation**:

* Create a 1D NumPy array containing the integers from 1 to 10.
* Convert it into a 2x5 matrix.

**Array Indexing and Slicing**:

* Given the following array:

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

* Extract the element at the second row, third column.
* Extract the first two rows and the last two columns.

1. **Array Operations**:
   * Create two arrays, a and b, each containing five random integers.
   * Perform the following operations: addition, subtraction, element-wise multiplication, and division.
2. **Statistical Operations**:
   * Create a NumPy array containing 10 random integers.
   * Calculate the mean, median, standard deviation, and variance of the array.
3. **Logical Operations**:
   * Given an array arr = np.array([5, 10, 15, 20, 25, 30]), create a boolean array that checks if each element is greater than 15.
   * Use this boolean array to extract elements from the original array.
4. **Random Sampling**:
   * Generate an array of 10 random integers between 1 and 100.
   * Reshape this array into a 2x5 matrix.