Practical Tasks for Pandas, Numpy, and Data Visualization

Part 1: Pandas (8 questions, 16 marks)

DataFrame Creation (2 marks)

Create a DataFrame from the following dictionary:

```
data = {
    'Name': ['Alice', 'Bob', 'Charlie', 'David', 'Eve'],
    'Age': [24, 27, 22, 32, 29],
    'Score': [85.5, 90.3, 88.0, 92.1, 78.8]
}
```

Inspecting DataFrame (2 marks)

Using the DataFrame created in question 1, display the first three rows.

Column Selection (2 marks)

Select and display the 'Name' and 'Score' columns from the DataFrame created in question 1.

Filtering Data (2 marks)

Filter the DataFrame to show only the rows where the 'Age' is greater than 25.

Adding a Column (2 marks)

Add a new column 'Passed' to the DataFrame, where the value is True if the 'Score' is greater than 80, otherwise False.

Sorting Data (2 marks)

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Sort the DataFrame by the 'Score' column in descending order.

Group By (2 marks)

Group the DataFrame by the 'Passed' column and calculate the mean 'Score' for each group.

Handling Missing Data (2 marks)

Add a new column 'Attendance' with values [90, np.nan, 85, 87, np.nan]. Write the code to fill missing values with the mean of the column.

Part 2: Numpy (8 questions, 16 marks)

Array Creation (2 marks)

Create a numpy array with values ranging from 10 to 19.

Array Reshape (2 marks)

Reshape the array created in question 9 into a 2x5 matrix.

Array Operations (2 marks)

Create two numpy arrays:

array1 = np.array([1, 2, 3])

array2 = np.array([4, 5, 6])

Perform element-wise addition and multiplication.

Array Indexing (2 marks)

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Using the array [10, 20, 30, 40, 50], select the second and fourth elements.

Array Slicing (2 marks)

Slice the array [1, 2, 3, 4, 5, 6] to get [2, 3, 4].

Statistical Functions (2 marks)

Compute the mean and standard deviation of the array [10, 20, 30, 40, 50].

Broadcasting (2 marks)

Provide an example of broadcasting with arrays of different shapes.

Matrix Operations (2 marks)

Create a 3x3 identity matrix using numpy.

Part 3: Data Visualization (4 questions, 8 marks)

Creating Box Plot (2 marks)

Using the following data, create a box plot using seaborn:

data = [12, 15, 14, 10, 8, 11, 14, 18, 22, 24, 30, 28, 26, 30, 32, 35, 38]

Creating Histogram (2 marks)

Using the same data as in question 17, create a histogram using matplotlib.

Creating Bar Plot (2 marks)

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Using the DataFrame from Part 1, create a bar plot to show the 'Score' of each individual using seaborn.

Creating Pie Plot (2 marks)

Create a pie plot using the following data: ['Apples', 'Bananas', 'Cherries', 'Dates'] with corresponding values [10, 15, 7, 3].