Python Assignment: ELC 2023

Case Study 1: Analyzing Student Performance

Example Dataset:

```python
import pandas as pd

data = {
    'Name': ['Alice', 'Bob', 'Charlie', 'David', 'Eva'],
    'Math_Score': [85, 90, 78, 92, 88],
    'English_Score': [80, 88, 75, 95, 82],
    'Science_Score': [92, 85, 89, 78, 94],
}

students_df = pd.DataFrame(data)
```

Tasks:

1. Calculate the average score for each student.
2. Find the student with the highest total score.
3. Identify students who need improvement (average score below 80).

Case Study 2: Sales Analysis

Example Dataset:

```python
import pandas as pd

data = {
    'Date': ['2023-01-01', '2023-01-02', '2023-01-03', '2023-01-04', '2023-01-05'],
    'Product_A': [120, 150, 200, 180, 210],
    'Product_B': [80, 90, 75, 100, 110],
}

sales_df = pd.DataFrame(data)
```

Tasks:

1. Convert the 'Date' column to a datetime object.
2. Calculate the total sales for each day.
3. Find the day with the highest total sales.
4. Visualize the sales trends using Matplotlib.

Python Assignment: ELC 2023

Case Study 3: Matrix Operations with NumPy

Example Dataset:

```python
import numpy as np

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

Tasks:

1. Perform element-wise addition and subtraction of the matrices.
2. Calculate the dot product of the matrices.
3. Find the transpose of each matrix.

Case Study 4: Employee Data Management

Example Dataset:

```python
import pandas as pd

employee_data = {
    'Employee_ID': [101, 102, 103, 104, 105],
    'Name': ['John', 'Alice', 'Bob', 'Eva', 'Charlie'],
    'Department': ['HR', 'Engineering', 'Marketing', 'HR', 'Engineering'],
    'Salary': [60000, 75000, 80000, 65000, 70000],
}

employee_df = pd.DataFrame(employee_data)
```

Tasks:

1. Identify the average salary in each department.
2. Find the employee with the highest salary.
3. Create a new column for the bonus (10% of the salary).

Python Assignment: ELC 2023

Case Study 5: Temperature Data Analysis

Example Dataset:

```python
import pandas as pd

temperature_data = {
    'Date': pd.date_range(start='2023-01-01', end='2023-01-10'),
    'City_A': [25.5, 26.2, 24.8, 23.5, 22.9, 27.0, 26.5, 25.8, 24.0, 23.2],
    'City_B': [22.0, 21.5, 23.8, 25.0, 24.5, 22.5, 21.0, 23.2, 24.5, 25.0],
}

temperature_df = pd.DataFrame(temperature_data)
```

Tasks:

1. Calculate the average temperature for each city.
2. Find the date with the highest temperature in City A.
3. Visualize the temperature trends for both cities using Matplotlib.