MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Computer Science and Engineering (CSE)

CSE 442: Machine Learning Sessional

Practice Evaluation-2

Question-1: "Office Efficiency Analysis: Multiple Linear Regression"

In an office setting, a group of diligent interns wants to optimize productivity. They collect data on factors like coffee consumption, desk proximity to the printer, and hours of sleep. Using multiple linear regression, they aim to predict individual work output. Students will code the analysis, generate figures, and present the results.

Dataset:

- Coffee Consumption (cups/day)
- Desk Proximity to Printer (in meters)
- Hours of Sleep (per night)
- Work Output (measured productivity)

Formula:

Predicted Work Output = $\beta_0 + \beta_1 * \text{Coffee Consumption} + \beta_2 * \text{Desk Proximity} + \beta_3 * \text{Hours of Sleep}$

In this formula:

- β_0 is the intercept (constant) term.
- β_1, β_2, and β_3 are the regression coefficients for Coffee Consumption, Desk Proximity, and Hours of Sleep, respectively.

Sample Input and Output:

Input	**Output**
• Coffee Consumption: 3 cups/day • Desk Proximity to Printer: 2.5 meters • Hours of Sleep: 7.5 hours/night	Predicted Work Output: 31.8

Question-2: "Employee Productivity Classification: Decision Tree Classifier"

Suppose you want to classify employees into three productivity categories based on their coffee consumption, desk proximity, and hours of sleep.

Conditions and Predictions:

- If an employee's Coffee Consumption is 2.0 cups/day or less:
    - If their Desk Proximity is 2.0 meters or less:
        - If they get 6.0 hours of Sleep or less:
            - Predicted Productivity: Low
        - Else:
            - Predicted Productivity: Medium
    - Else (Desk Proximity > 2.0 meters):
        - Predicted Productivity: Medium
- If an employee's Coffee Consumption is more than 2.0 cups/day:
    - If their Desk Proximity is 3.0 meters or less:
        - If they get 6.0 hours of Sleep or less:
            - Predicted Productivity: Medium
        - Else:
            - Predicted Productivity: High
    - Else (Desk Proximity > 3.0 meters):
        - Predicted Productivity: High

So,

- Low productivity is predicted if the employee consumes little coffee, is very close to the printer, and gets limited sleep.
- Medium productivity is predicted if the employee consumes little coffee but has a moderate distance to the printer or if they consume more coffee and are closer to the printer but still get adequate sleep.
- High productivity is predicted if the employee consumes more coffee and is either closer to the printer or gets sufficient sleep, or if they consume even more coffee.

Sample Input and Output:

Input	**Output**
• Coffee Consumption: 3 cups/day • Desk Proximity to Printer: 2.5 meters • Hours of Sleep: 7.5 hours/night	Predicted Productivity Category: High