Practice Questions

Question 1)

Write a program that generates the first n terms (user input) of this sequence:

$$a_k = k^2 + (-1)^{k+1} \times k$$

The program should:

1. Ask for the number of terms (n).
2. Generate and display the sequence.
3. Calculate the average of the generated terms.

Question 2)

Create a 6×6 matrix where each element follows this pattern:

$$B(i,j) = i^3 - j^2$$

Then write a MATLAB script to:

1. Display the entire matrix.
2. Calculate the sum of all elements in the third column.
3. Find the maximum value in the fifth row.

Question 3)

Write a MATLAB script that:

1. Takes a positive integer n as user input.
2. Calculates 2 raised to the power of n using a **for** loop (without using the ^ operator).
3. Displays the result in the format: "2^5 = 32".

Question 4)

Write a MATLAB script using a **for** loop to compute the sum of the first 20 terms of the following series:

$$S = \sum_{k=1}^{20} (5k^2 - 2k + 7)$$

Your program should calculate and display the final sum.

Question 5)

A construction company is building a rectangular swimming pool and wants to estimate the cost of tiling and filling it with water.

Given Data:

- Length: 6 m
- Width: 3 m
- Depth: 1.5 m
- Tile cost: 200 TL/m²
- Water cost: 5 TL/m³

Tasks:

1. Write a MATLAB function that calculates the total cost.
2. Compute the surface area to be tiled (floor and four walls).
3. Compute the water volume needed to fill the pool.
4. Calculate and display the total cost.

Hint:

- The tiling area includes the bottom and four vertical walls.
- Use the volume formula for a rectangular prism: $V = l \times w \times d$

Question 6)

You are analyzing vehicle speed data recorded in kilometers per hour (km/h) and need to display them in both km/h and miles per hour (mph).

Given Data:

Speeds (in km/h): 40, 60, 80, 100, 120

Task:

1. Convert the speeds from km/h to mph using the formula:

$$mph = km/h \times 0.621371$$

2. Display the values in a formatted table using **fprintf** with this structure:

   Speed: 40.00 km/h | 24.85 mph

   Speed: 60.00 km/h | 37.28 mph

   ...

Question 7)

Create a program that converts seconds to hours, minutes, and remaining seconds.

Task:

1. Ask the user to enter a time duration in seconds.
2. Convert to hours, minutes, and seconds format.
3. Display the result in this format:
   HH:MM:SS (e.g., 3675 seconds → 01:01:15)

Question 8)

Develop a program that calculates a student's final grade based on weighted scores.

Task:

1. Ask the user to enter scores for:
    - Exams (50% weight)
    - Homework (30% weight)
    - Participation (20% weight)
2. Calculate the final grade (0-100 scale)
3. Convert to letter grade:
    - A: 90-100
    - B: 80-89
    - C: 70-79
    - D: 60-69
    - F: <60
4. Display both numerical and letter grade.

Question 9)

Develop a program that calculates Body Mass Index (BMI) and classifies it into categories.

Task:

1. Ask the user to enter their weight (kg) and height (m).
2. Calculate BMI using: $BMI = \frac{\text{weight}}{\text{height}^2}$
3. Classify using these categories:
    - Underweight: BMI < 18.5
    - Normal: 18.5 ≤ BMI < 25
    - Overweight: 25 ≤ BMI < 30
    - Obese: BMI ≥ 30
4. Display the BMI value and category.