Assignment 1

1. **Variables and Arithmetic Operations:**
   Write a Python/MATLAB program that calculates the area of a circle given the radius. Use the formula $A = \pi r^2$ with $r = 5$.

2. **Conditional Statements:**
   Write a Python/MATLAB program that asks the user for a number and prints whether it is a positive, negative, or zero. *Hint: use input() function to ask for input from user.*

3. **Loops – For Loop:**
   Write a Python/MATLAB program that calculates the sum of all even numbers between 1 and a number n (you can use any number for n).

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4. **Loops – While Loop:**
   Write a Python/MATLAB program that continuously asks the user for numbers and prints their cumulative sum. The loop should stop when the user enters a negative number.

5. **Matrix Operations:**
   Create two 3×3 matrices and:
   a. Add the matrices
   b. Multiply the matrices
   c. Find the determinant of the second matrix

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6. **Functions:**
   Write a Python/MATLAB function called `time_constants` that takes the damping coefficient ζ and natural frequency ω_n of a second-order system as inputs, and returns the system's settling time t_s and peak time t_p. The formulas are:

$$t_s = \frac{4}{\zeta \omega_n}, \qquad t_p = \frac{\pi}{\omega_n \sqrt{1-\zeta^2}}$$

   Test the function with $\zeta = 0.5$ and $\omega_n = 2$.

7. **Plotting Graphs:**
   Plot the function $y = \cos(x)$ for x ranging from 0 to 2π using Python or MATLAB. Add gridlines and labels to the plot.