

**PSG COLLEGE OF TECHNOLOGY, COIMBATORE -641004**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**I SEMESTER MCA**  
**23MX16 C PROGRAMMING LABORATORY**  
**PROBLEM SHEET 2 - WEEK 2**

1. Write a C program that accepts a positive integer from the keyboard. If the input is invalid, it stops with appropriate message. For a valid input, it determines the first and last digits of the number. Further, it checks whether the first digit or the last digit is multiple of the other with appropriate message.
2. Write a C program that reads two real numbers (from keyboard) representing the x and y coordinates of a point in the Cartesian plane. It then checks whether the point lies inside, outside or on a circle of radius 5 with centre at the origin. Finally, it prints appropriate message too.

(Example: Typical input: 2.5 3.0

Typical output: The point lies inside the circle

Typical input: 1.9 4.8

Typical output: The point lies outside the circle

Typical input: 3.0 4.0 Typical output: The point lies on the circle)

3. Write a C program that accepts a positive integer (from the keyboard). If the input is invalid, it stops after printing the message Invalid input. For a valid input, it then computes and prints out the sum

$$1 \cdot n + 2 \cdot (n - 1) + 3 \cdot (n - 2) + \dots + (n - 1) \cdot 2 + n \cdot 1$$

4. Write a C program that accepts a three digit positive integer from the keyboard. If the input is invalid, it stops after printing the message Invalid input. For a valid input, it then checks whether the sum of the digits is equal to the product of the digits. Finally, it prints appropriate message too.

(Example: Typical input: 123

Typical output: The sum of the digits is equal to the product of the digits

Typical input: 121

Typical output: The sum of the digits is NOT equal to the product of the digits)

5. Write a C program that accepts a three digit positive integer from the keyboard. If the input is invalid, it stops after printing the message Invalid input. For a valid input, it then checks whether the sum of the first and the last digits is equal to the middle digit. Finally, it prints appropriate message too.
6. The Bessel function of the first kind of order zero is defined by

$$J_0(x) = \sum_{n=0}^{\infty} \frac{(-1)^n}{(n!)^2} \left(\frac{x}{2}\right)^{2n} = 1 - \frac{x^2}{2^2(1!)^2} + \frac{x^4}{2^4(2!)^2} - \frac{x^6}{2^6(3!)^2} + \dots$$

Write a C program that accepts real  $x$  from the keyboard. Then it calculates and prints out the value of  $J_0(x)$  using the first 20 terms only.

7. Find the sum of the series  $X+XX+XXX+ \dots$  upto  $n$  terms. Where  $X$  and  $n$  are user inputs.
8. Write C program to print a Magic square for given size ' $n$ '.
9. Write and demonstrate a C program to find all fractions with two-digit numerators and denominators for which "Sleepy's" Technique work correctly

i.e. Sleepy's Technique

$$\frac{26}{65} = \frac{2}{5}$$

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Fractions where Sleepy's Technique works:

$$16/64 = 1/4$$

$$19/95 = 1/5$$

$$26/65 = 2/5$$

$$49/98 = 4/8$$

10. Consider an array of numbers from 1 to N . In this array, one of the numbers gets duplicated and one is missing. Write a C program to find out the duplicated number. Condition: Using only one loop and without any extra memory.

Deadline: 26.08.2025