Question 1:

Write a program that take to find the sum of the following series:

$$1 + \frac{x}{1} + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots + \frac{x^n}{n!}$$

where x and n are given as input.

Question 2:

Write a program that given an m-by-n integer matrix a[m][n]: if a[i][j] is 0, set all elements in row i and column j to 0.

Do not use any extra arrays.

For example, if the input is left matrix below, then the output should be the matrix on the right.

$$\begin{bmatrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \\ 0 & 9 & 0 & 1 \end{bmatrix} \qquad \begin{bmatrix} 0 & 2 & 0 & 4 \\ 0 & 6 & 0 & 8 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

Question 3:

Write a C++ program that reads the names and grades of multiple students from standard input. The program should calculate the average grade and determine how many students passed (assuming a passing grade is 50 or above). The program should be able to read from standard input file provided and store in output file.

Output Format:

- Print the total number of students processed.
- Print the average grade.
- Print the number of students who passed.

Question 4:

Write a C++ program that traverses a 2D array in a zigzag pattern. The traversal should start from the top-left corner, move to the top-right corner, then go down one row and move from the right to the left, and so on. You can hardcode the array.

Input:

1 2 3
4 5 6
7 8 9

Output:

1 2 3 6 5 4 7 8 9

Question 5:

Write a C++ program that checks whether an array of integers is a palindrome (the same forwards and backwards). Print true if it is a palindrome; otherwise, print false. You can hardcode the array.

Question 6:

Write a C++ program that rotates an array to the right by k positions. For example, if the array is {1, 2, 3, 4, 5} and k = 2, the output should be {4, 5, 1, 2, 3}. You can hardcode the array.

Question 7:

Write a C++ program that prints the multiplication table from 1 to 10. Use nested loops to generate and print the table.

Question 8:

Write a C++ program to generate the Fibonacci series up to a specified number of terms.

Question 9

Write a C++ program to check whether a number is prime or not.

Question 10

Write a program that counts the number of digits in a given integer n.