**Case Study 1: Simple Calculator**

**Problem:** Create a C# program that takes two numbers as input and performs basic arithmetic operations (addition, subtraction, multiplication, and division).

**Solution:**

using System;

class Calculator

{

static void Main()

{

Console.Write("Enter first number: ");

double num1 = Convert.ToDouble(Console.ReadLine());

Console.Write("Enter second number: ");

double num2 = Convert.ToDouble(Console.ReadLine());

Console.WriteLine($"Addition: {num1 + num2}");

Console.WriteLine($"Subtraction: {num1 - num2}");

Console.WriteLine($"Multiplication: {num1 \* num2}");

Console.WriteLine($"Division: {num1 / num2}");

}

}

**Case Study 2: Even or Odd Number**

**Problem:** Write a C# program that checks whether a number is even or odd.

**Solution:**

using System;

class EvenOddCheck

{

static void Main()

{

Console.Write("Enter a number: ");

int num = Convert.ToInt32(Console.ReadLine());

if (num % 2 == 0)

Console.WriteLine($"{num} is Even.");

else

Console.WriteLine($"{num} is Odd.");

}

}

**Case Study 3: Simple Interest Calculation**

**Problem:** Create a program to calculate simple interest given principal, rate, and time.

**Solution:**

using System;

class SimpleInterest

{

static void Main()

{

Console.Write("Enter principal amount: ");

double principal = Convert.ToDouble(Console.ReadLine());

Console.Write("Enter rate of interest: ");

double rate = Convert.ToDouble(Console.ReadLine());

Console.Write("Enter time in years: ");

double time = Convert.ToDouble(Console.ReadLine());

double simpleInterest = (principal \* rate \* time) / 100;

Console.WriteLine($"Simple Interest: {simpleInterest}");

}

}

**Case Study 4: Swap Two Numbers**

**Problem:** Swap two numbers without using a third variable.

**Solution:**

using System;

class SwapNumbers

{

static void Main()

{

Console.Write("Enter first number: ");

int a = Convert.ToInt32(Console.ReadLine());

Console.Write("Enter second number: ");

int b = Convert.ToInt32(Console.ReadLine());

a = a + b;

b = a - b;

a = a - b;

Console.WriteLine($"After swapping: First = {a}, Second = {b}");

}

}

**Case Study 5: Find Largest Among Three Numbers**

**Problem:** Write a C# program to find the largest number among three inputs.

**Solution:**

using System;

class LargestNumber

{

static void Main()

{

Console.Write("Enter first number: ");

int a = Convert.ToInt32(Console.ReadLine());

Console.Write("Enter second number: ");

int b = Convert.ToInt32(Console.ReadLine());

Console.Write("Enter third number: ");

int c = Convert.ToInt32(Console.ReadLine());

int largest = (a > b) ? (a > c ? a : c) : (b > c ? b : c);

Console.WriteLine($"Largest number is: {largest}");

}

}

**Case Study 6: Check for Prime Number**

**Problem:** Write a C# program to check if a number is prime.

**Solution:**

using System;

class PrimeCheck

{

static void Main()

{

Console.Write("Enter a number: ");

int num = Convert.ToInt32(Console.ReadLine());

bool isPrime = true;

if (num < 2) isPrime = false;

else

{

for (int i = 2; i <= Math.Sqrt(num); i++)

{

if (num % i == 0)

{

isPrime = false;

break;

}

}

}

Console.WriteLine(isPrime ? $"{num} is a Prime Number." : $"{num} is not a Prime Number.");

}

}

**Case Study 7: Reverse a String**

**Problem:** Write a C# program to reverse a string input from the user.

**Solution:**

using System;

class ReverseString

{

static void Main()

{

Console.Write("Enter a string: ");

string str = Console.ReadLine();

char[] charArray = str.ToCharArray();

Array.Reverse(charArray);

Console.WriteLine($"Reversed string: {new string(charArray)}");

}

}

**Case Study 8: Factorial of a Number**

**Problem:** Write a C# program to calculate the factorial of a given number.

**Solution:**

using System;

class Factorial

{

static void Main()

{

Console.Write("Enter a number: ");

int num = Convert.ToInt32(Console.ReadLine());

int fact = 1;

for (int i = 1; i <= num; i++)

{

fact \*= i;

}

Console.WriteLine($"Factorial of {num} is {fact}");

}

}

**Case Study 9: Fibonacci Series**

**Problem:** Generate the Fibonacci series up to N terms.

**Solution:**

using System;

class FibonacciSeries

{

static void Main()

{

Console.Write("Enter number of terms: ");

int n = Convert.ToInt32(Console.ReadLine());

int a = 0, b = 1, temp;

Console.Write("Fibonacci Series: ");

for (int i = 0; i < n; i++)

{

Console.Write(a + " ");

temp = a + b;

a = b;

b = temp;

}

}

}

**Case Study 10: Palindrome Checker**

**Problem:** Write a C# program to check if a given string is a palindrome.

**Solution:**

using System;

class PalindromeCheck

{

static void Main()

{

Console.Write("Enter a string: ");

string str = Console.ReadLine();

string reversed = new string(str.Reverse().ToArray());

Console.WriteLine(str.Equals(reversed, StringComparison.OrdinalIgnoreCase) ? "Palindrome" : "Not a Palindrome");

}

}