Programming in C# Lab
BCA-DS-651

Manav Rachna International Institute of Research and Studies

School of Computer Applications

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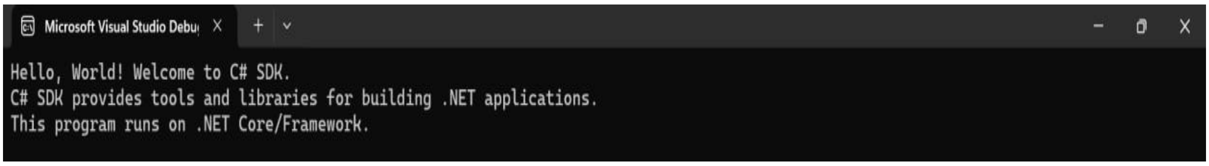
INDEX

10	14/02/2025	Program 10: Write programs to understand the working of predefined string functions like Compare (), CompareTo( ), Concat( ), a.Copy( ) and Join().		
11	27/02/2025	Program 11: Write a program to implement class and its objects.		
12	27/02/2025	Program 12: Write a program to implement constructors.		

1. Write program to demonstrate the working of C# SDK.

```
using System;

class Program

{

static void Main()

{

Console.WriteLine("Hello, World! Welcome to C# SDK.");

Console.WriteLine("C# SDK provides tools and libraries for building .NET applications.");

Console.WriteLine("This program runs on .NET Core/Framework.");

}

}
```

Output:-

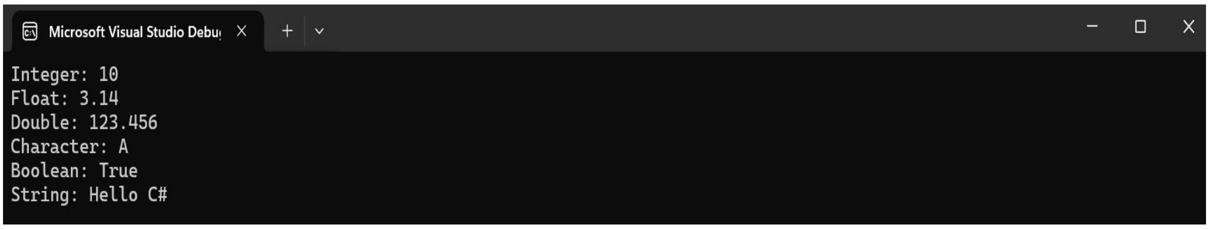


```
Hello, World! Welcome to C# SDK.
C# SDK provides tools and libraries for building .NET applications.
This program runs on .NET Core/Framework.
```

2. **Write program to show the use of various data types available in C#.**

```
using System;

class DataTypesExample

{

    static void Main()

    {

        int num = 10;

        float pi = 3.14f;

        double largeDecimal = 123.456;

        char letter = 'A';

        bool isTrue = true;

        string message = "Hello C#";

        Console.WriteLine($"Integer: {num}");

        Console.WriteLine($"Float: {pi}");

        Console.WriteLine($"Double: {largeDecimal}");

        Console.WriteLine($"Character: {letter}");

        Console.WriteLine($"Boolean: {isTrue}");

        Console.WriteLine($"String: {message}");

    }

}
```

Output:-

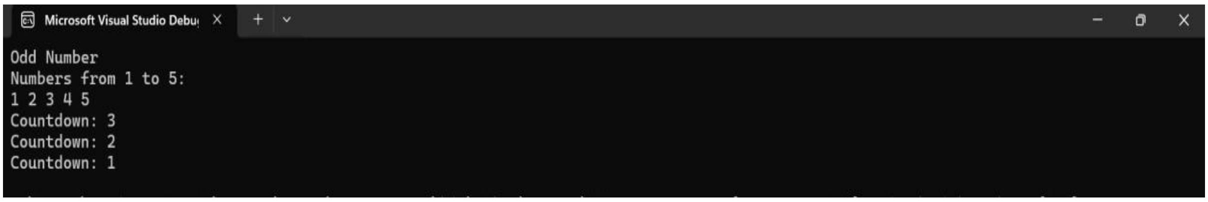


```
Integer: 10
Float: 3.14
Double: 123.456
Character: A
Boolean: True
String: Hello C#
```

3. **Write programs to understand the use of Control statements.**

```
using System;

class ControlStatementsExample

{

    static void Main()

    {

        int num = 5;

        // If-else

        if (num % 2 == 0)

            Console.WriteLine("Even Number");

        else

            Console.WriteLine("Odd Number");

        // For loop

        Console.WriteLine("Numbers from 1 to 5:");

        for (int i = 1; i <= 5; i++)

            Console.Write(i + " ");

        Console.WriteLine();

        // While loop

        int count = 3;

        while (count > 0)

        {

            Console.WriteLine("Countdown: " + count);

            count--;

        }

    }

}
```

Output:-

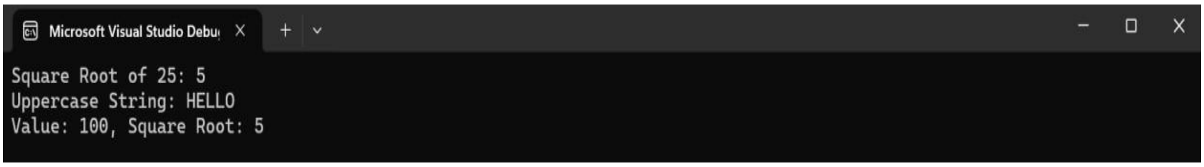


```
Odd Number
Numbers from 1 to 5:
1 2 3 4 5
Countdown: 3
Countdown: 2
Countdown: 1
```

4. Write programs to understand the use of library functions.

```
using System;

class LibraryFunctionsExample

{

    static void Main()

    {

        double sqrtValue = Math.Sqrt(25);

        string upperCase = "hello".ToUpper();

        string formatted = string.Format("Value: {0}, Square Root: {1}", 100, sqrtValue);

        Console.WriteLine($"Square Root of 25: {sqrtValue}");

        Console.WriteLine($"Uppercase String: {upperCase}");

        Console.WriteLine(formatted);

    }

}
```

Output:-

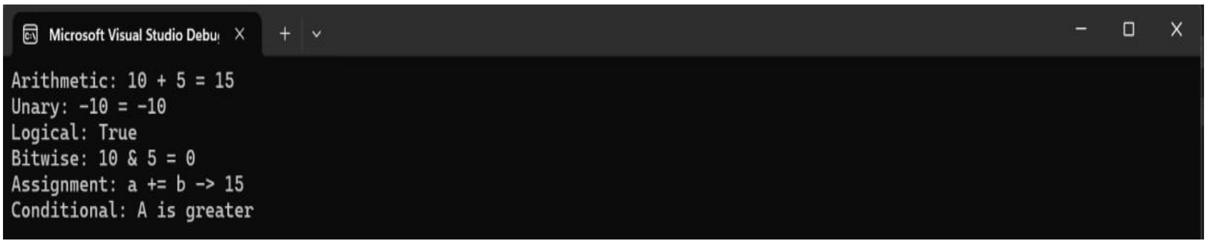


```
Square Root of 25: 5
Uppercase String: HELLO
Value: 100, Square Root: 5
```

5. Write a program to demonstrate the use of various arithmetic, unary, logical, bit-wise, assignment and conditional operators.

```
using System;

class OperatorsExample

{

    static void Main()

    {

        int a = 10, b = 5;

        Console.WriteLine($"Arithmetic: {a} + {b} = {a + b}");

        Console.WriteLine($"Unary: -{a} = {-a}");

        Console.WriteLine($"Logical: {a > b && b < 15}");

        Console.WriteLine($"Bitwise: {a} & {b} = {a & b}");

        Console.WriteLine($"Assignment: a += b -> {a += b}");

        Console.WriteLine($"Conditional: {(a > b ? "A is greater" : "B is greater")}");

    }

}
```

Output:-

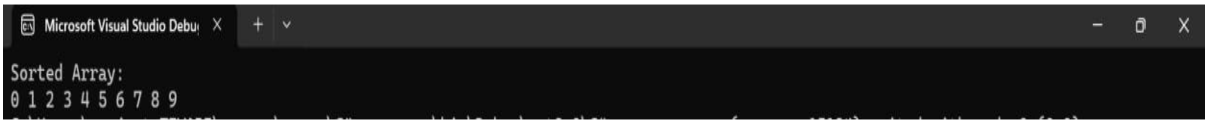


```
Arithmetic: 10 + 5 = 15
Unary: -10 = -10
Logical: True
Bitwise: 10 & 5 = 0
Assignment: a += b -> 15
Conditional: A is greater
```

6. Write a program to store 10 elements in an array and display the array elements in increasing order.

```
using System;

class ArraySorting

{

  static void Main()

  {

    int[] arr = { 9, 5, 2, 8, 3, 7, 1, 6, 4, 0 };

    Array.Sort(arr);

    Console.WriteLine("Sorted Array:");

    foreach (int num in arr)

      Console.Write(num + " ");

  }

}
```

Output:-

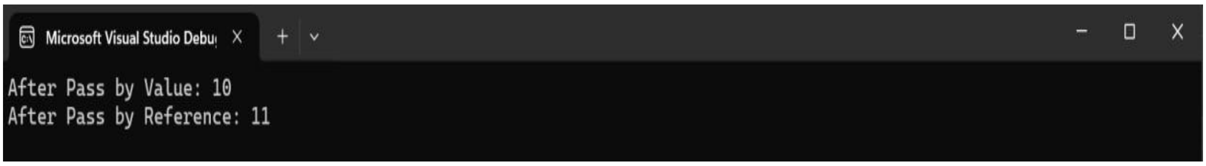


```
Sorted Array:
0 1 2 3 4 5 6 7 8 9
```

7. Demonstrate the use of pass by value and pass by reference by writing a program.

```
using System;
class PassExample
{
    static void IncrementByValue(int num)
    {
        num++;
    }
    static void IncrementByReference(ref int num)
    {
        num++;
    }
    static void Main()
    {
        int val = 10;
        IncrementByValue(val);
        Console.WriteLine("After Pass by Value: " + val);
        IncrementByReference(ref val);
        Console.WriteLine("After Pass by Reference: " + val);
    }
}
```

Output:-

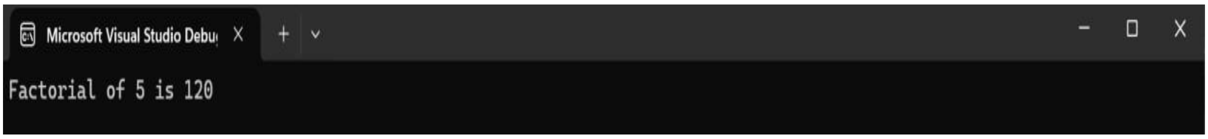


```
After Pass by Value: 10
After Pass by Reference: 11
```

8. Write a program to implement recursion.

```
using System;

class RecursionExample

{

    static int Factorial(int n)

    {

        if (n == 1) return 1;

        return n * Factorial(n - 1);

    }

    static void Main()

    {

        int num = 5;

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

    }

}
```

Output:-



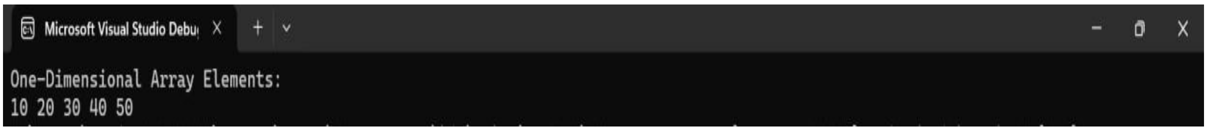
```
Factorial of 5 is 120
```

9. Write programs to implement one dimensional and two dimensional arrays.

1-D Array

```
using System;

class OneDArrayExample

{

    static void Main()

    {

        int[] numbers = { 10, 20, 30, 40, 50 };

        Console.WriteLine("One-Dimensional Array Elements:");

        for (int i = 0; i < numbers.Length; i++)

        {

            Console.Write(numbers[i] + " ");

        }

    }

}
```

Output:-

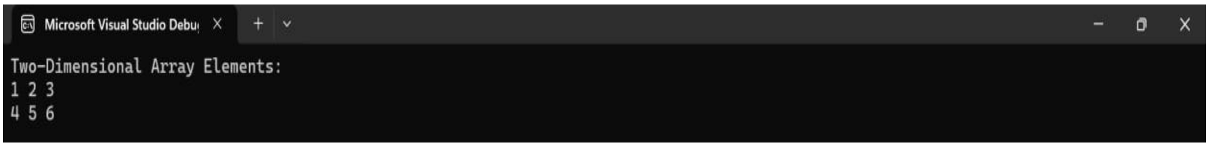


```
One-Dimensional Array Elements:
10 20 30 40 50
```

2-D Array

```
using System;

class TwoDArrayExample

{

   static void Main()

   {

       int[,] matrix = { { 1, 2, 3 }, { 4, 5, 6 } };

       Console.WriteLine("Two-Dimensional Array Elements:");

       for (int i = 0; i < 2; i++)

       {

           for (int j = 0; j < 3; j++)

           {

               Console.Write(matrix[i, j] + " ");

           }

           Console.WriteLine();

       }

   }

}
```

Output:-



```
Two-Dimensional Array Elements:
1 2 3
4 5 6
```

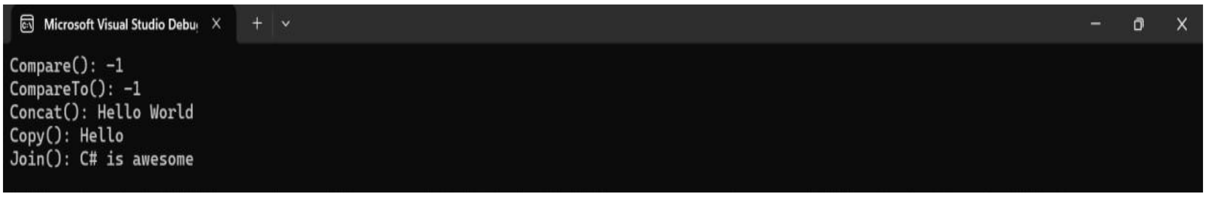
10. Write programs to understand the working of predefined string functions like Compare( ), CompareTo( ),

Concat( ),

a. **Copy( ) and Join().**

```
using System;

class StringFunctions

{

    static void Main()

    {

        string str1 = "Hello";

        string str2 = "World";

        // Compare()

        int result = string.Compare(str1, str2);

        Console.WriteLine("Compare(): " + result); // Returns -1, 0, or 1

        // CompareTo()

        int result2 = str1.CompareTo(str2);

        Console.WriteLine("CompareTo(): " + result2); // Similar to Compare()

        // Concat()

        string concatenated = string.Concat(str1, " ", str2);

        Console.WriteLine("Concat(): " + concatenated);

        // Copy()

        string copiedString = string.Copy(str1);

        Console.WriteLine("Copy(): " + copiedString);

        // Join()

        string[] words = { "C#", "is", "awesome" };

        string joinedString = string.Join(" ", words);

        Console.WriteLine("Join(): " + joinedString);

    }
}
```

Output:-

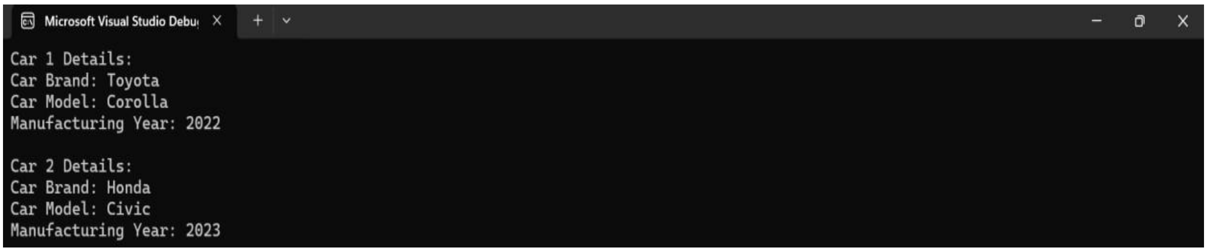


```
Compare(): -1
CompareTo(): -1
Concat(): Hello World
Copy(): Hello
Join(): C# is awesome
```

11. Write a program to implement class and its objects.

```
using System;
class Car
{
    // Fields (Attributes)
    public string Brand;
    public string Model;
    public int Year;
    // Constructor to initialize values
    public Car(string brand, string model, int year)
    {
        Brand = brand;
        Model = model;
        Year = year;
    }
    // Method to Display Car Information
    public void DisplayCarInfo()
    {
        Console.WriteLine("Car Brand: " + Brand);
        Console.WriteLine("Car Model: " + Model);
        Console.WriteLine("Manufacturing Year: " + Year);
    }
}
class Program
{
    static void Main()
    {
        // Creating objects of the Car class
        Car car1 = new Car("Toyota", "Corolla", 2022);

        Car car2 = new Car("Honda", "Civic", 2023);

        // Displaying car details

        Console.WriteLine("Car 1 Details:");

        car1.DisplayCarInfo();

        Console.WriteLine("\nCar 2 Details:");

        car2.DisplayCarInfo();

    }

}
```

Output:-

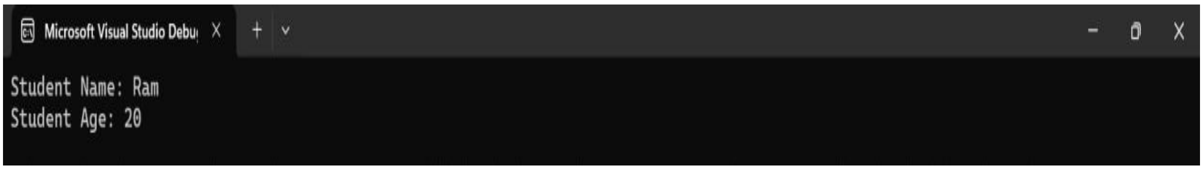


```
Car 1 Details:
Car Brand: Toyota
Car Model: Corolla
Manufacturing Year: 2022

Car 2 Details:
Car Brand: Honda
Car Model: Civic
Manufacturing Year: 2023
```

12. Write a program to implement constructors.

```
using System;

class Student

{

    public string Name;

    public int Age;

    // Constructor

    public Student(string name, int age)

    {

        Name = name;

        Age = age;

    }

    public void Display()

    {

        Console.WriteLine("Student Name: " + Name);

        Console.WriteLine("Student Age: " + Age);

    }

}

class Program

{

    static void Main()

    {

        Student student1 = new Student("Ram", 20);

        student1.Display();

    }

}
```

Output:-



```
Student Name: Ram
Student Age: 20
```