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Lab 2: Tasks on Looping, Arrays and Functions

PRE-LAB

1. Differentiate the iteration statement and goto statement

Solution:

Iteration statements (e.g., for, while, do-while) repeat a block of code based on a condition, while goto statement transfers control to a labeled statement, potentially disrupting the normal flow of execution.

2. Are we able to store dissimilar items in Array? if yes justify?

Solution:

Yes, we can store dissimilar items in an array if the array type is declared as an array of objects (`object[]`), as all types in C# are derived from the `object` type.

3. How many types of arrays in C#.net? and what are they?

Solution:

In C#.NET, there are three types of arrays:

1. Single-dimensional arrays
2. Multi-dimensional arrays
3. Jagged arrays

4. How can we initialize all the types of arrays in C#.Net?

Solution:

1. Single-dimensional array: int[] numbers = {1, 2, 3, 4, 5};
2. Multi-dimensional array: int[,] matrix = { {1, 2}, {3, 4}, {5, 6} };
3. Jagged array: int[][] jaggedArray = new int[3][] { new int[] {1, 2}, new int[] {3, 4, 5}, new int[] {6, 7, 8, 9} };

5. In how many ways can we define functions? Write the syntaxes.

Solution:

1.Instance Methods:

```
class MyClass {
    public void MyMethod() {
        // Method body
    }
}
```

2.Static Methods:

```
class MyClass {
    public static void MyStaticMethod() {
        // Method body
    }
}
```

3.Extension Methods:

```
public static class MyExtensions {
    public static void MyExtensionMethod(this string str) {
        // Method body
    }
}
```

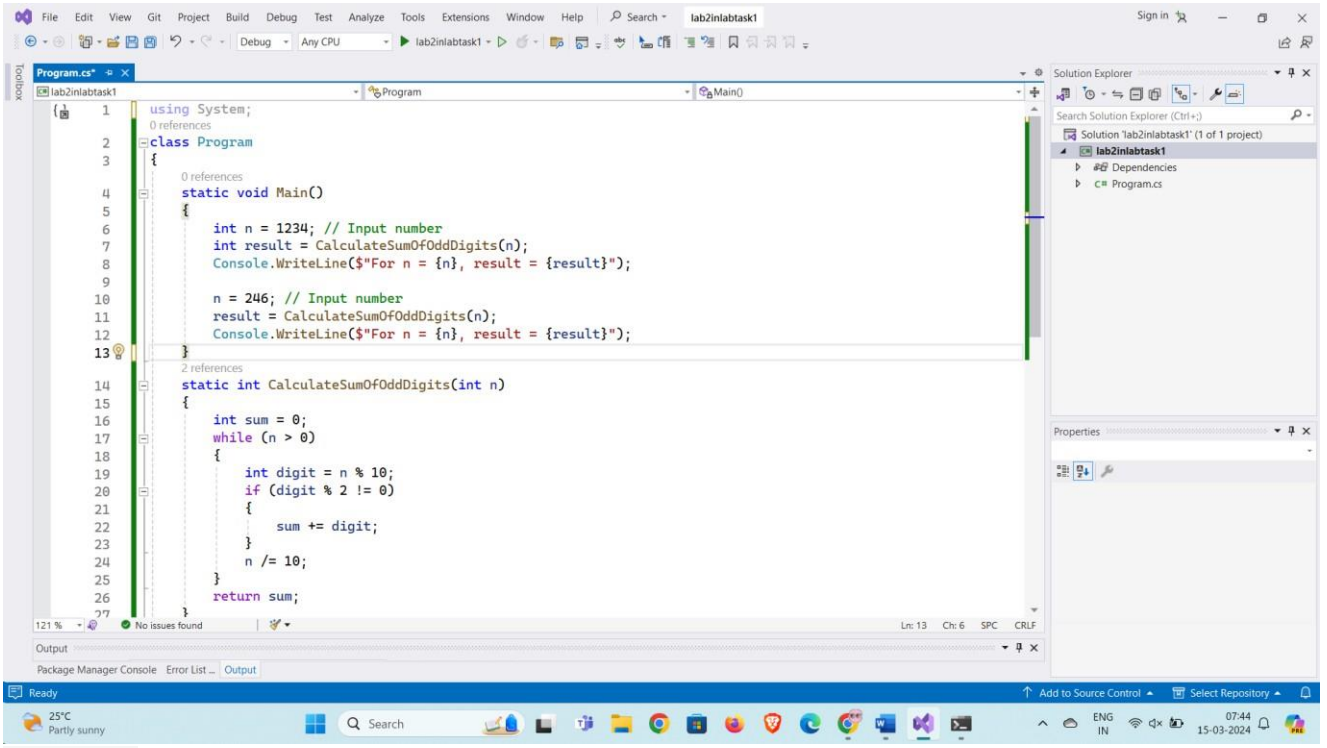
IN-LAB:

1. Write a C# code to implement the Tasks on Looping Statements?

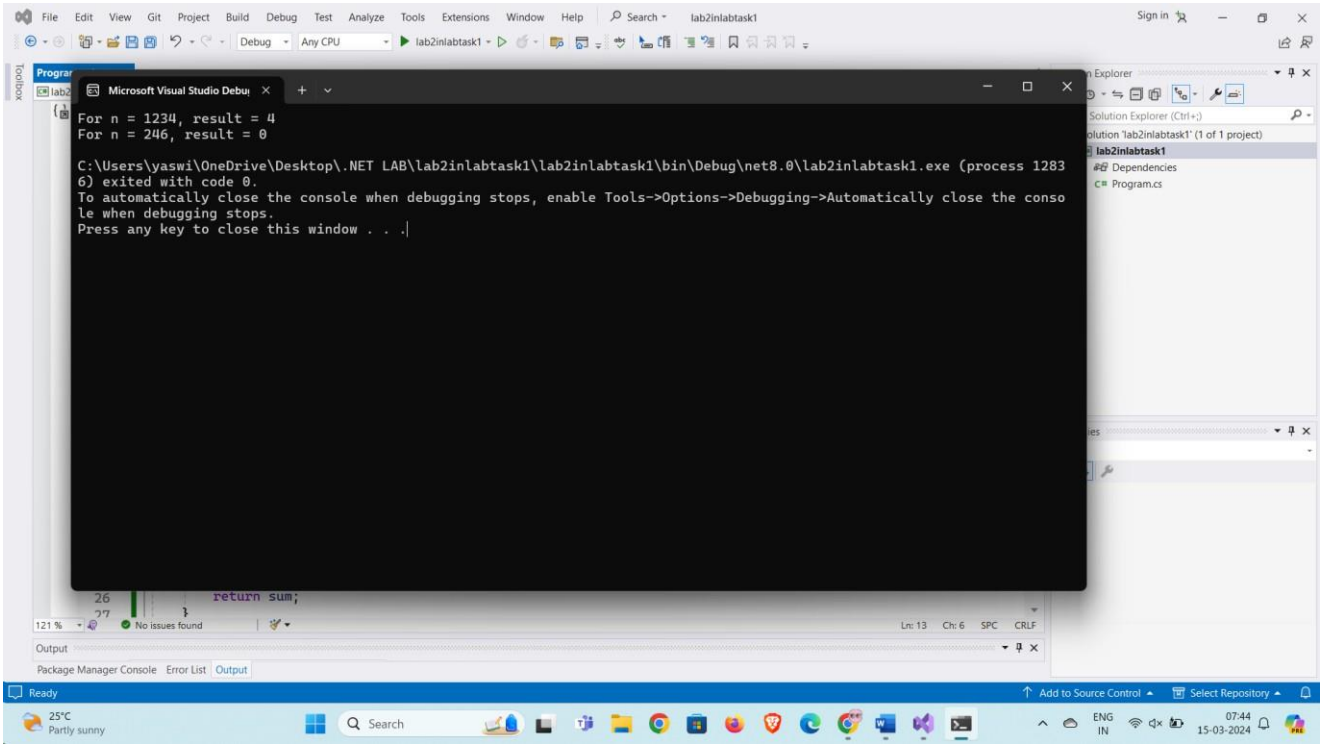
TASK1: For a positive integer *n* calculate the *result* value, which is equal to the sum of the odd numbers in *n*

Example

```
n = 1234    result = 4 (1 + 3)
n = 246     result = 0
```



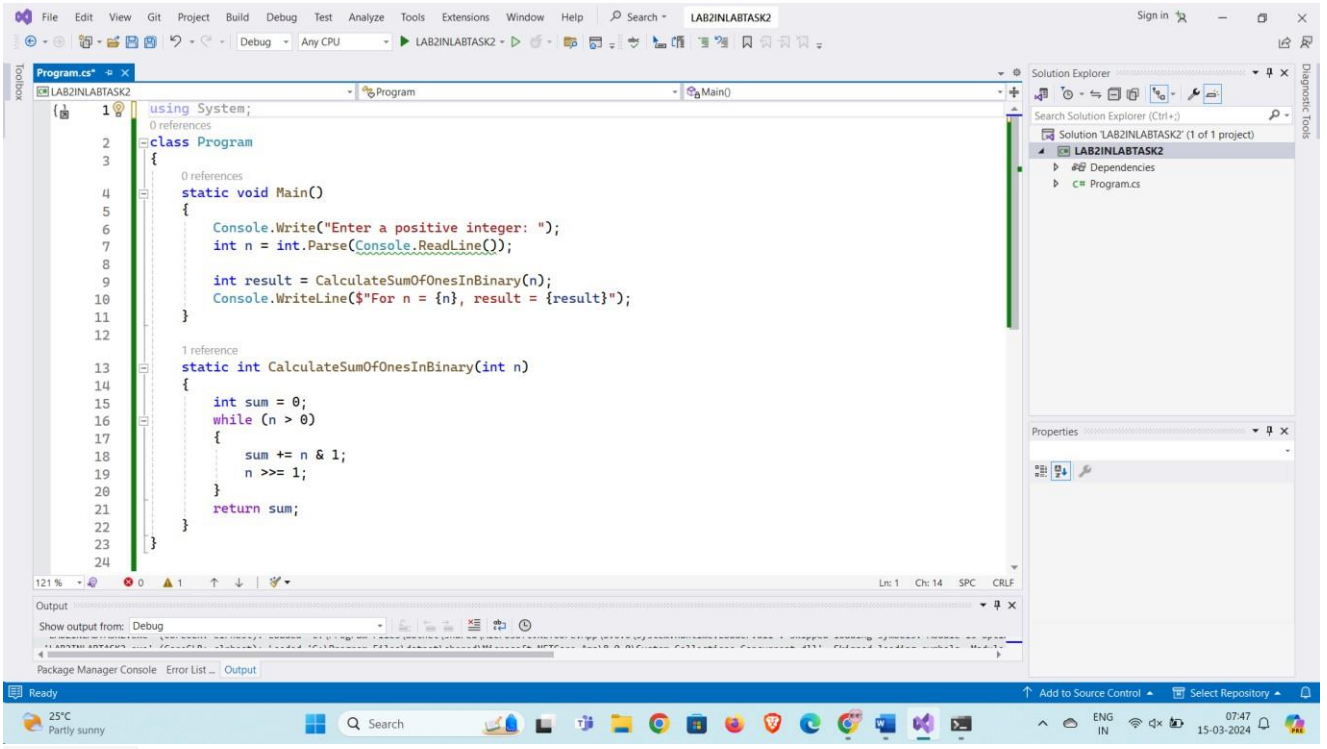
OUTPUT:



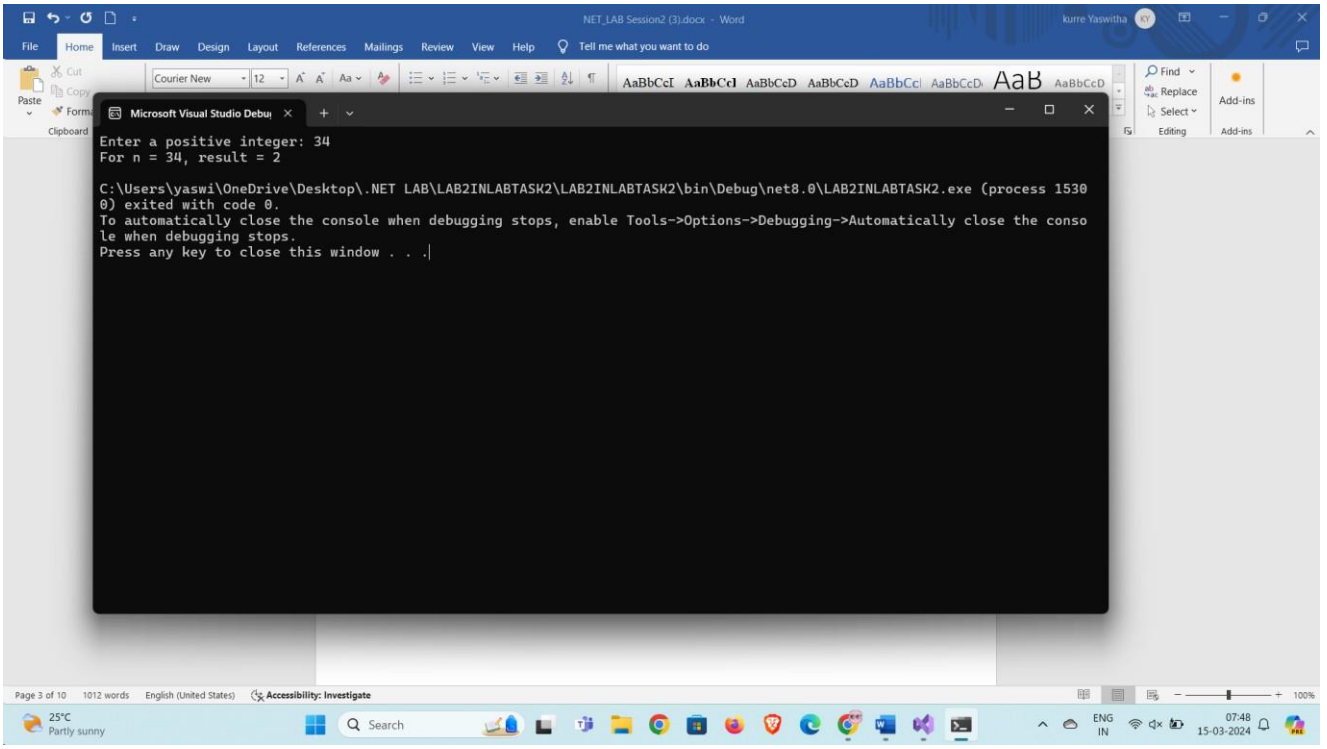
TASK2: For a positive integer *n* calculate the result value, which is equal to the sum of the "1" in the binary representation of *n*.

Example

```
n = 14(decimal) = 1110(binary)        result =  3
n = 128(decimal) = 1000 0000(binary) result  =  1
```



OUTPUT:

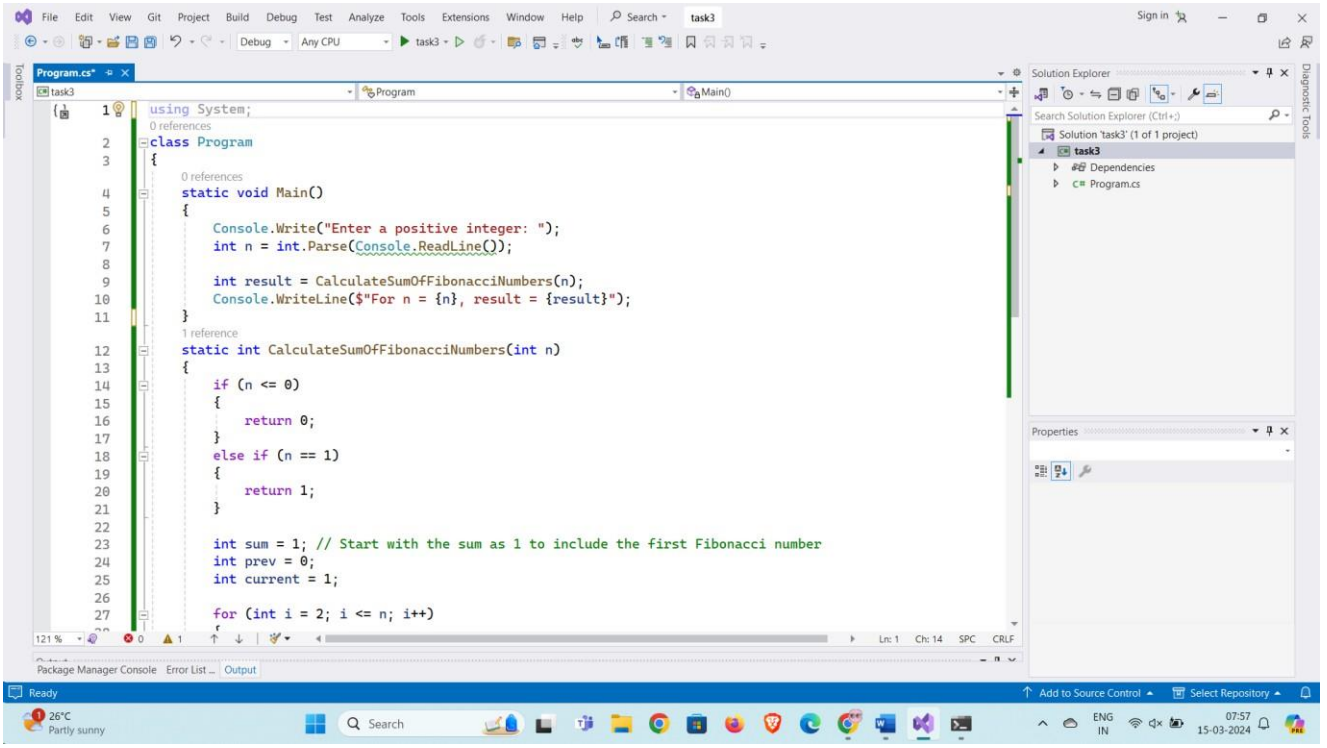


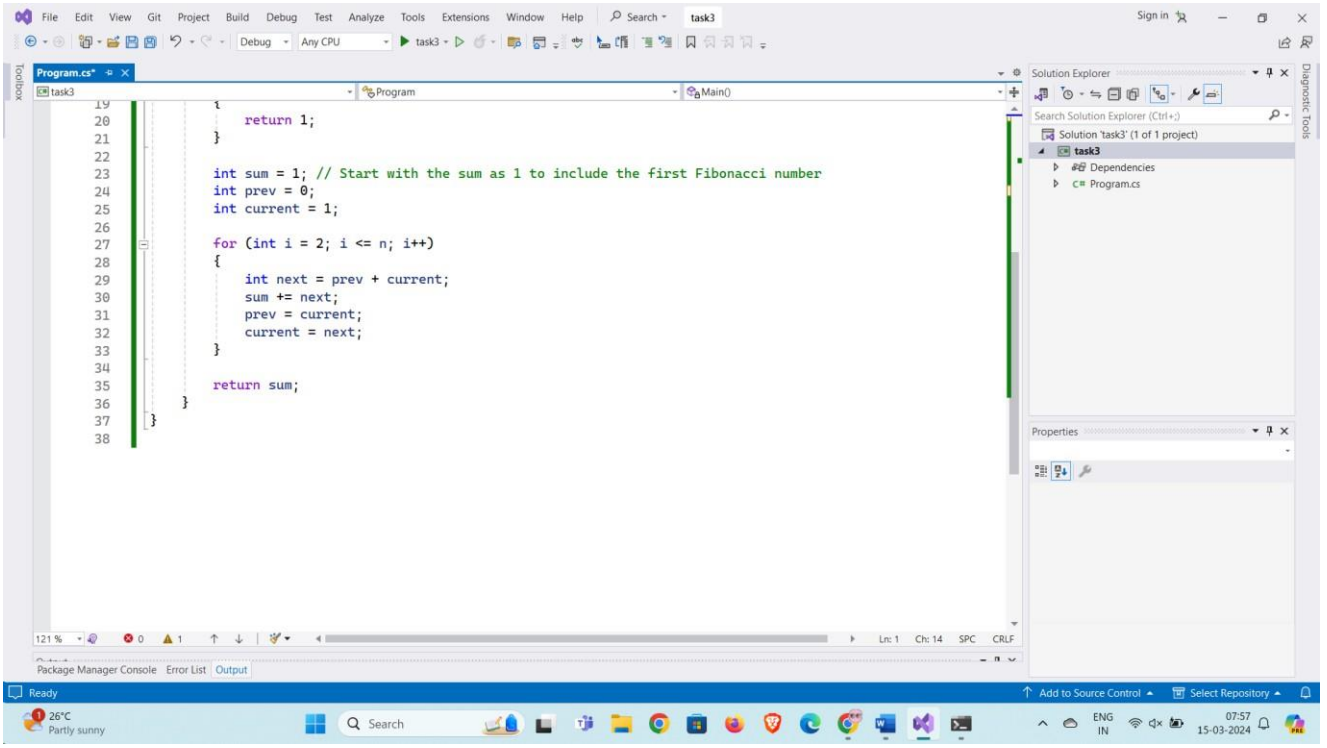
TASK3: For a positive integer *n*, calculate the result value equal to the sum of the first *n* Fibonacci numbers Note: Fibonacci numbers are a series of numbers in which each next number is equal to the sum of the two preceding ones: 0, 1, 1, 2, 3, 5, 8, 13... (F0=0, F1=F2=1, then F(n)=F(n-1)+F(n-2) for n>2)

Example

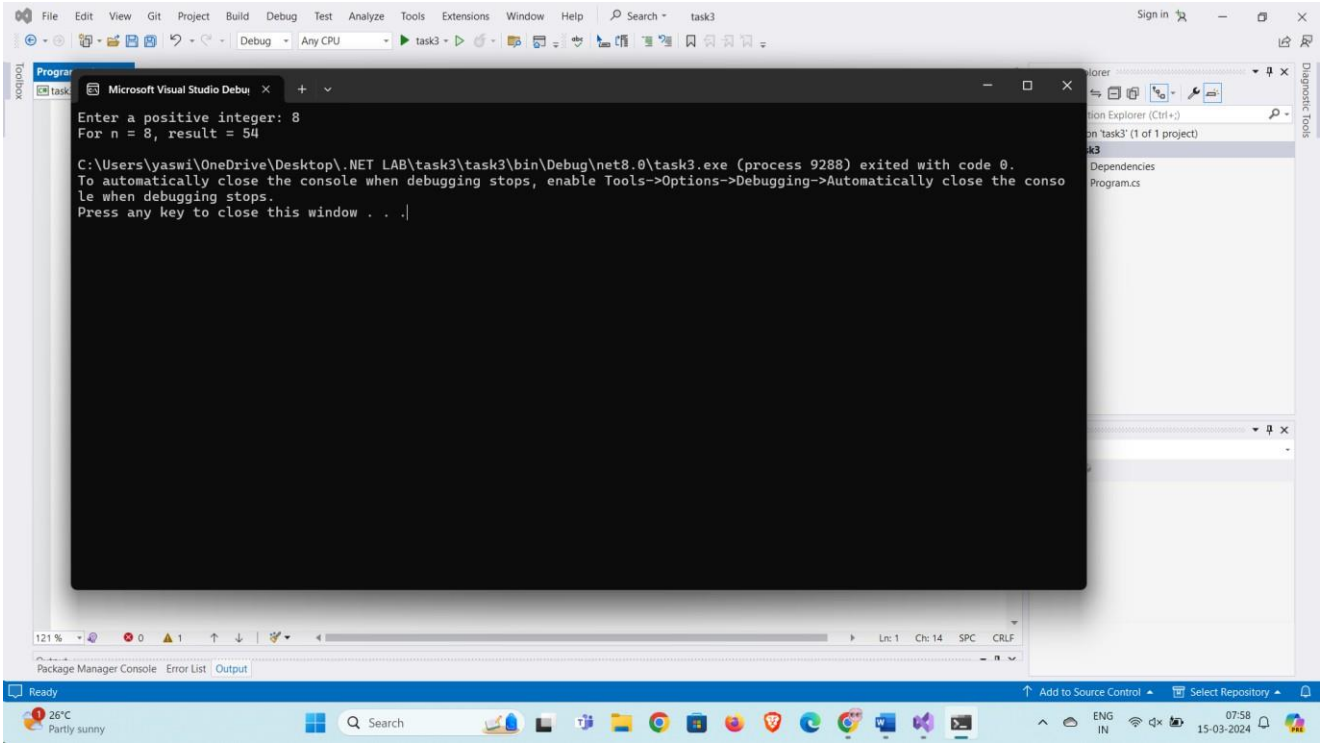
```
n = 8     result = 33
n = 11    result = 143
```

Solution:




return 1;
}
int sum = 1; // Start with the sum as 1 to include the first Fibonacci number
int prev = 0;
int current = 1;
for (int i = 2; i <= n; i++)
{
int next = prev + current;
sum += next;
prev = current;
current = next;
}
return sum;
}
}

OUTPUT:

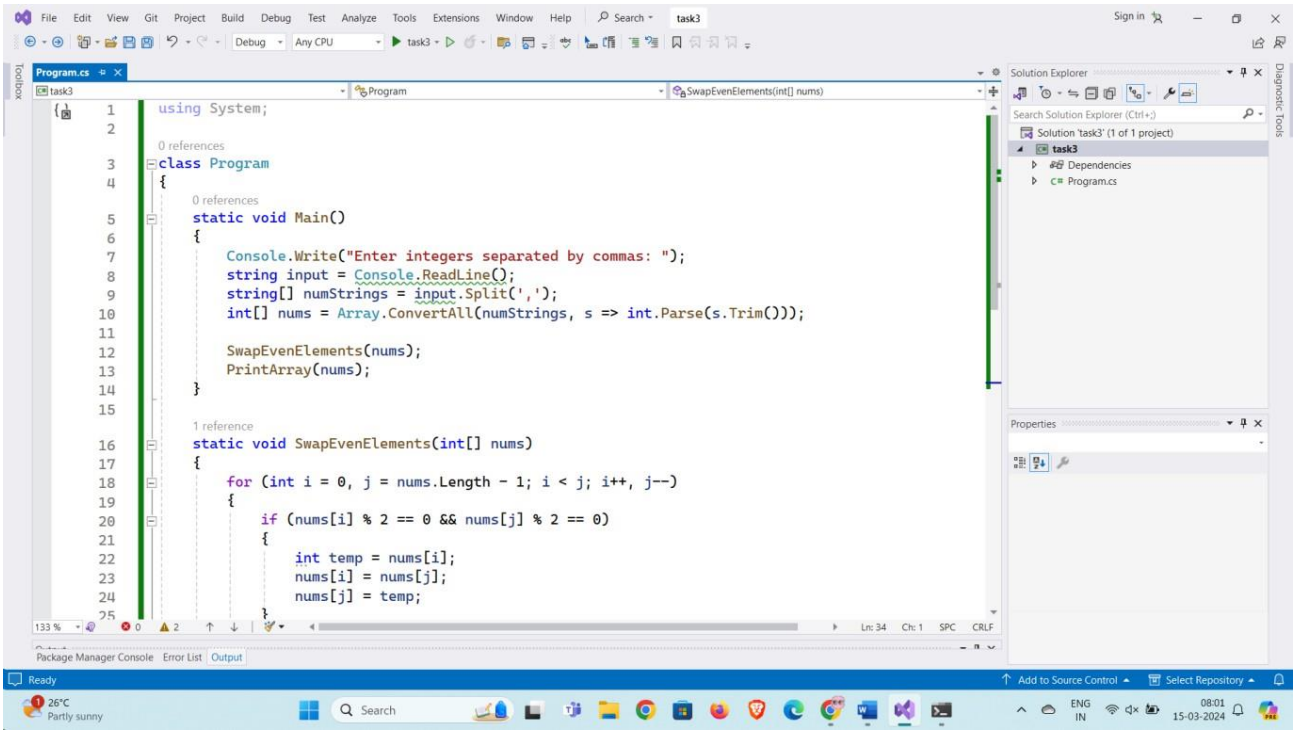

Microsoft Visual Studio Debu
Enter a positive integer: 8
For n = 8, result = 54
C:\Users\yaswi\OneDrive\Desktop\.NET LAB\task3\task3\bin\Debug\net8.0\task3.exe (process 9288) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the conso
le when debugging stops.
Press any key to close this window . . .

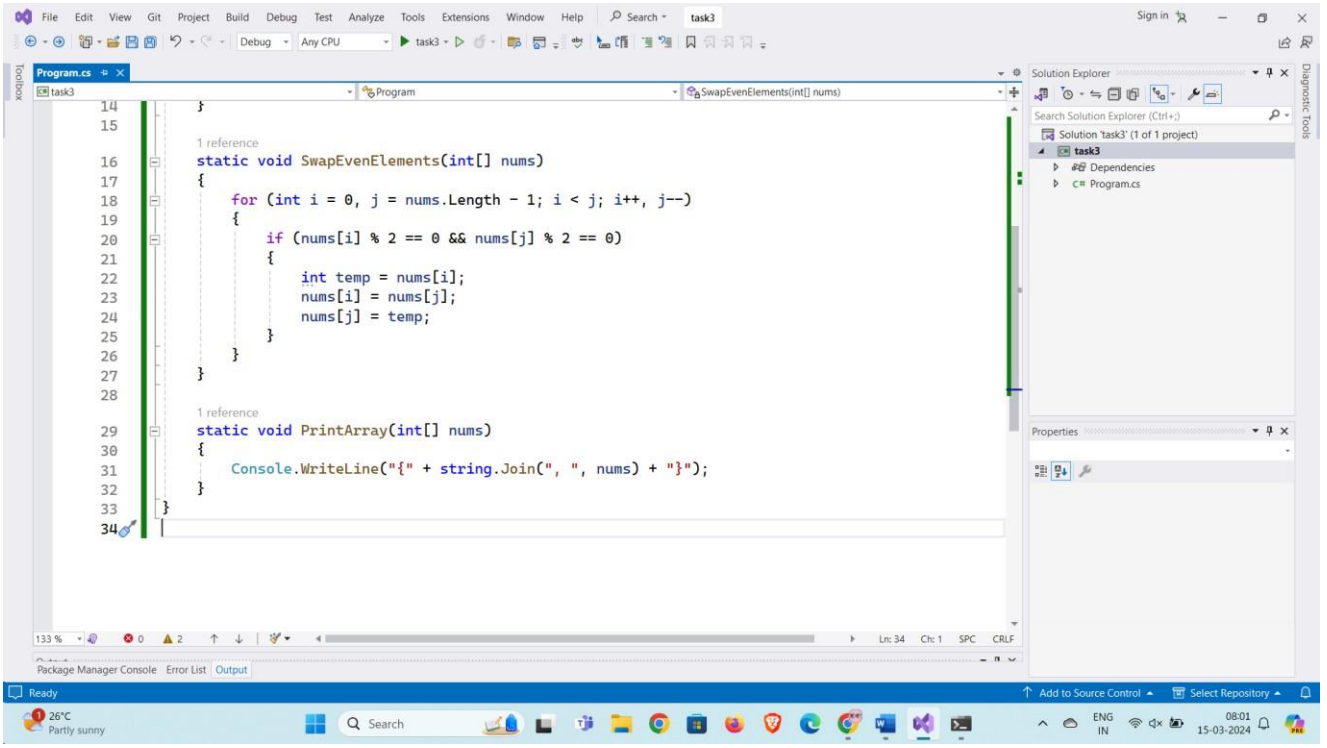
2. Write a C# code to implement the Tasks on Arrays?

TASK 1: In a given array of integers ***nums*** swap values of the first and the last array elements, the second and the penultimate etc., if the two exchanged values are even

Example

```
{ 10 , 5, 3, 4}                          =>  {4, 5, 3, 10}
{100, 2, 3, 4, 5}                       => {100, 4, 3, 2, 5}
{100, 2, 3, 45, 33, 8, 4, 54} => {54, 4, 3, 45, 33, 8, 2, 100}
```



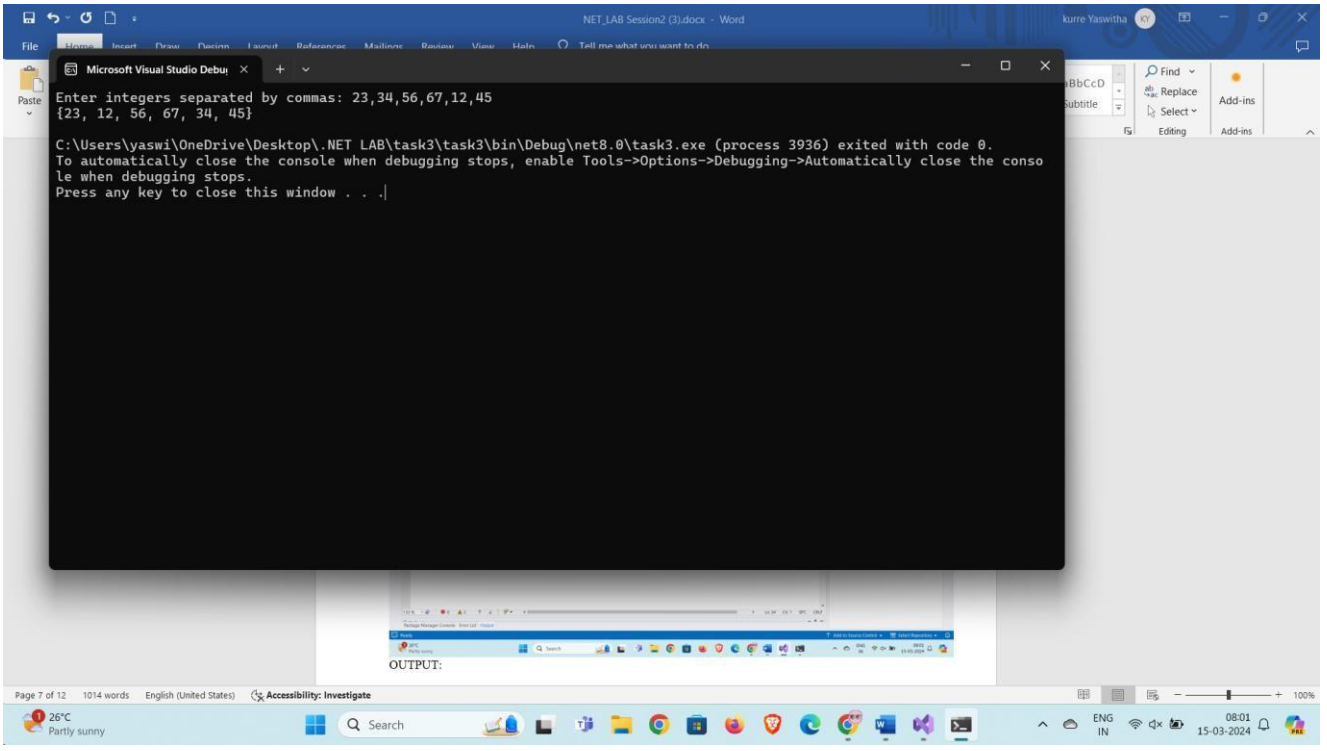


```
    }

    1 reference
    static void SwapEvenElements(int[] nums)
    {
        for (int i = 0, j = nums.Length - 1; i < j; i++, j--)
        {
            if (nums[i] % 2 == 0 && nums[j] % 2 == 0)
            {
                int temp = nums[i];
                nums[i] = nums[j];
                nums[j] = temp;
            }
        }
    }

    1 reference
    static void PrintArray(int[] nums)
    {
        Console.WriteLine("{" + string.Join(", ", nums) + "}");
    }
}
```

OUTPUT:



```
Enter integers separated by commas: 23,34,56,67,12,45
{23, 12, 56, 67, 34, 45}

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To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the conso
le when debugging stops.
Press any key to close this window . . .
```
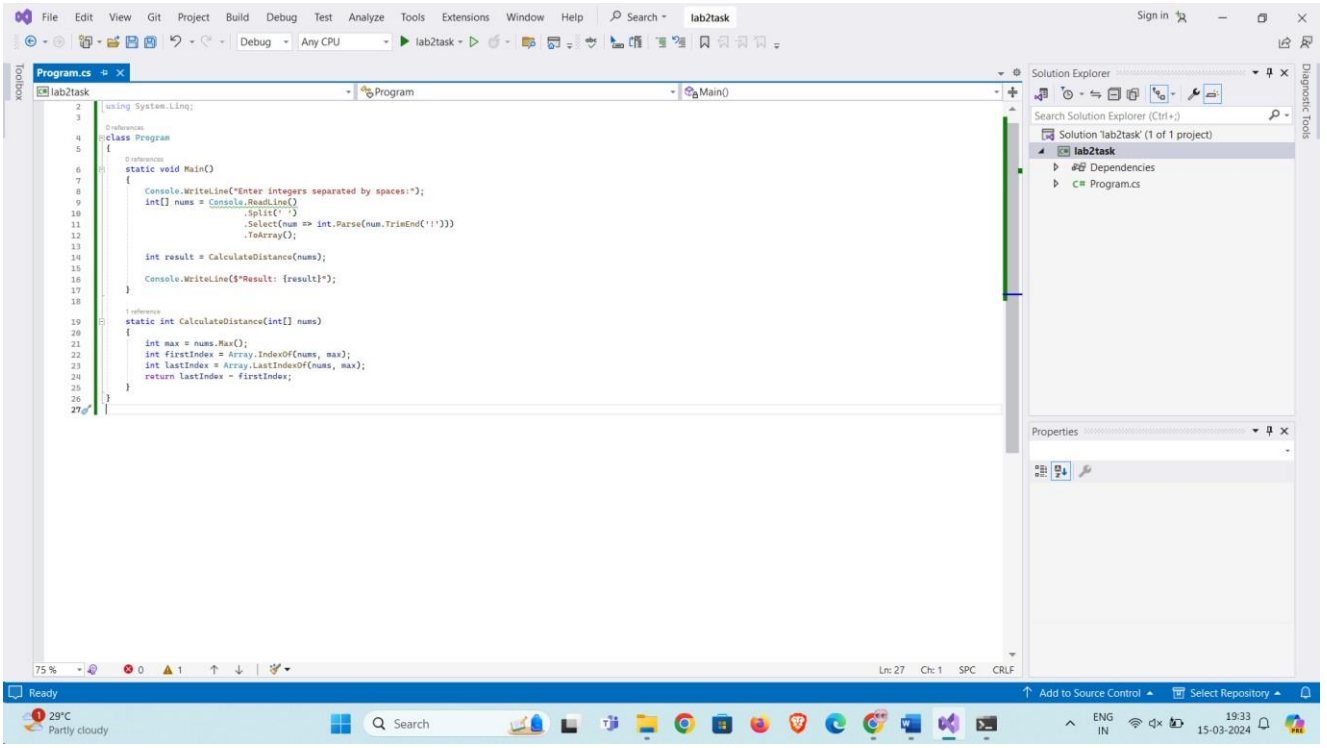

OUTPUT:

TASK 2:

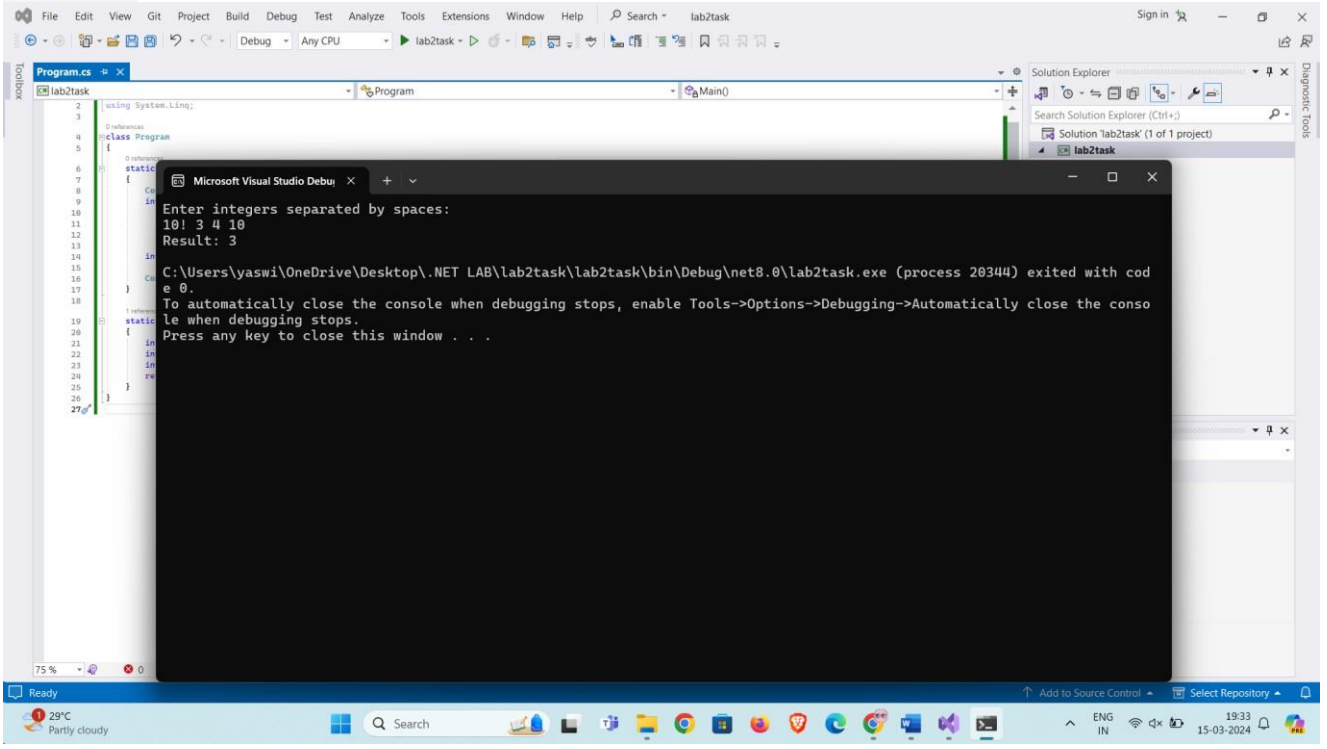
In a given array of integers ***nums*** calculate integer ***result*** value, that is equal to the distance between the first and the last entry of the maximum value in the array.

Example

```
{4, 100!, 3, 4}              result = 0
{5, 50!, 50!, 4, 5}          result = 1
{5, 350!, 350, 4, 350!} result = 3
{10!, 10, 10, 10, 10!}    result = 4
```



OUTPUT:



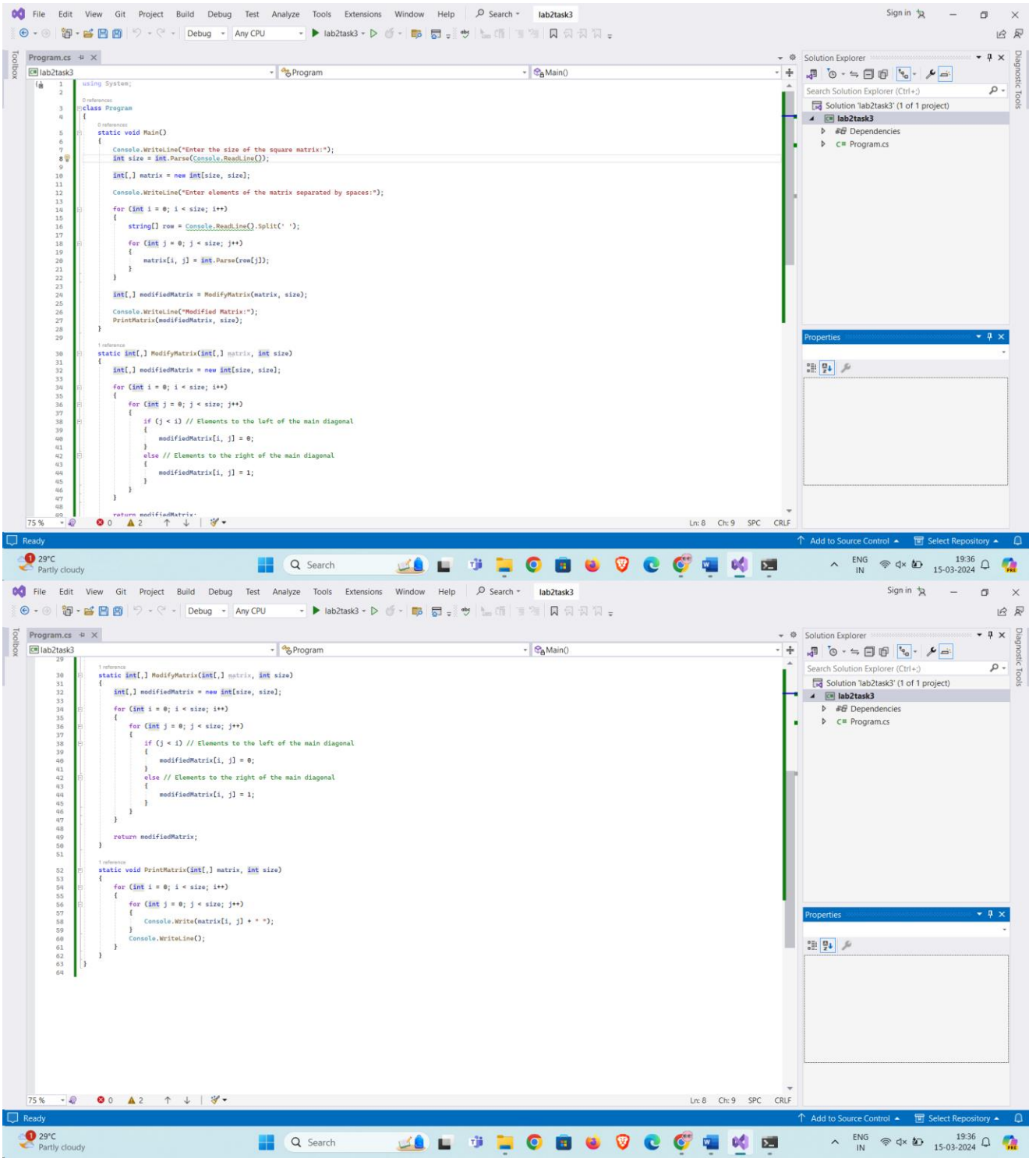
TASK 3: In a predetermined two-dimensional integer array (square matrix) ***matrix*** insert 0 into elements to the left side of the main diagonal, and 1 into elements to the right side of the diagonal.

Example

```
{{2, 4, 3, 3},            {{2, 1, 1, 1},
 {5, 7, 8, 5},     =>     {0, 7, 1, 1},
 {2, 4, 3, 3},              {0, 0, 3, 1},
```

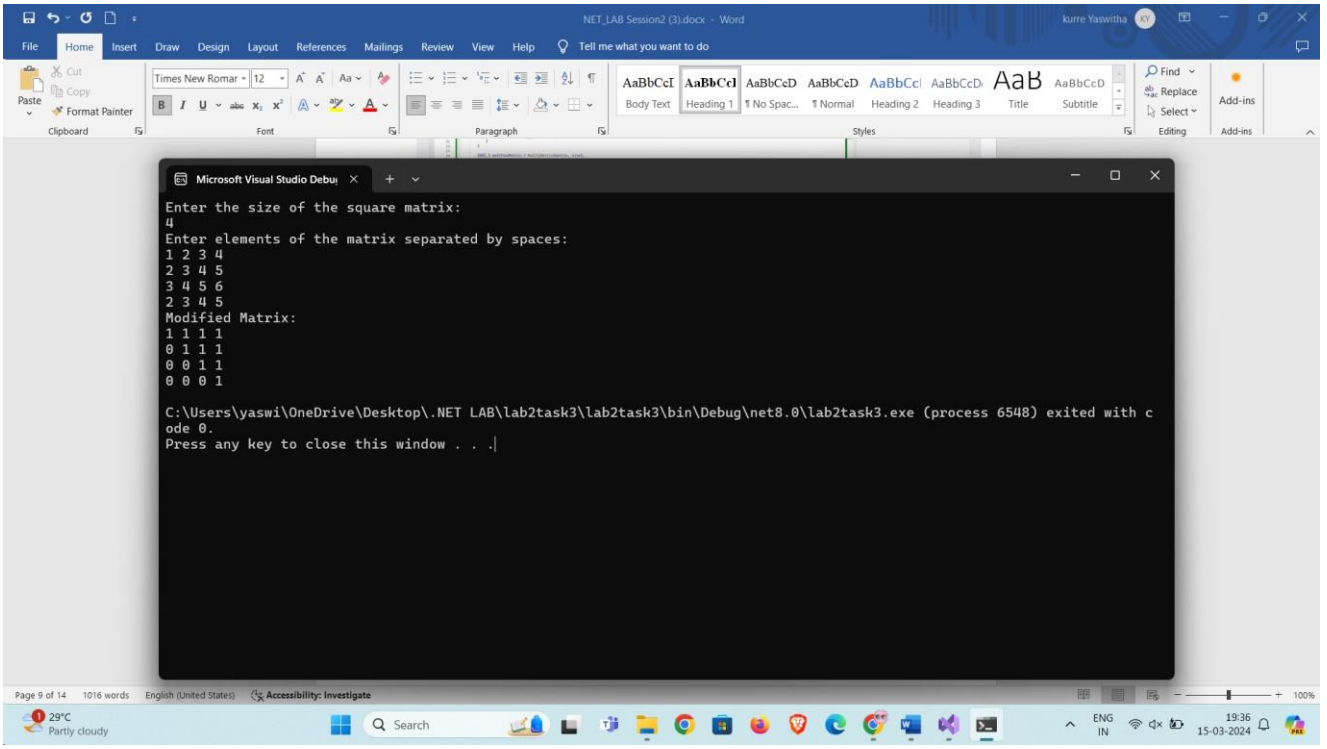
```
{5, 7, 8, 5}}                {0, 0, 0, 5}}
```

Solution:



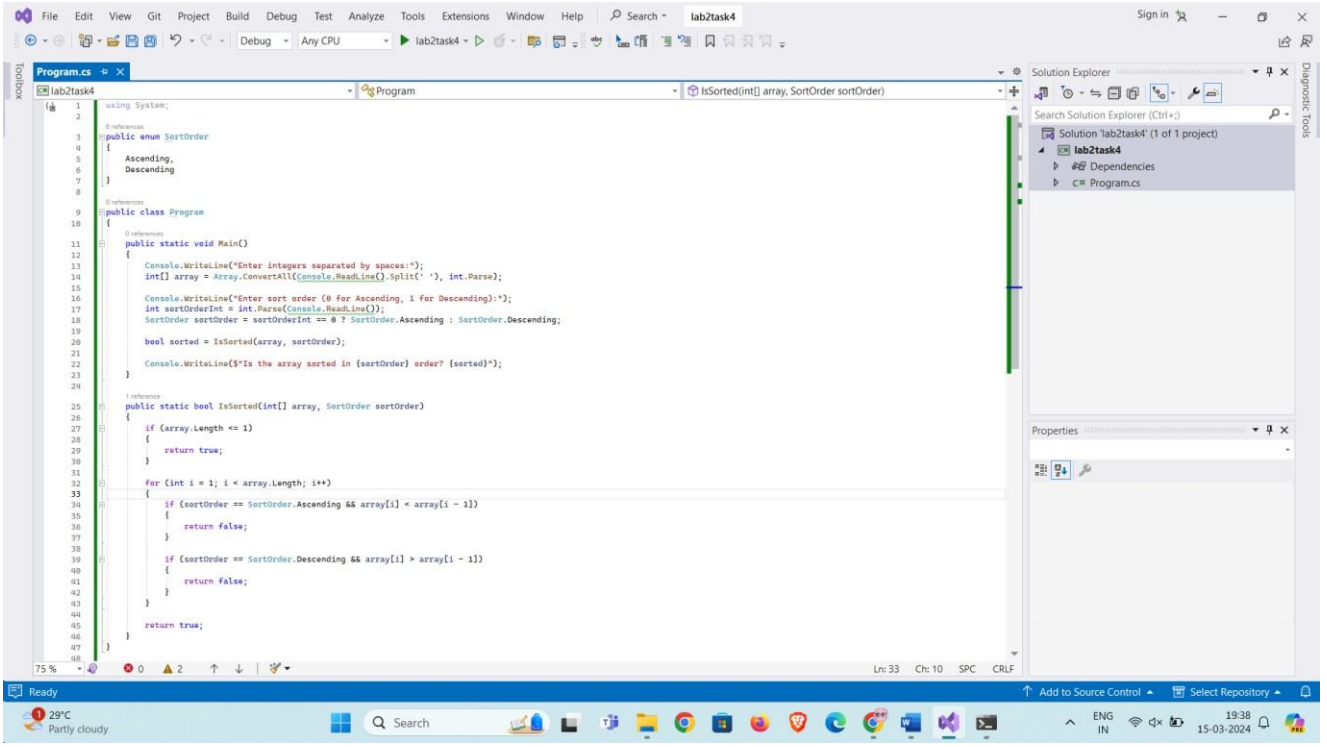
```
using System;

class Program
{
    static void Main()
    {
        Console.WriteLine("Enter the size of the square matrix:");
        int size = int.Parse(Console.ReadLine());

        int[,] matrix = new int[size, size];

        Console.WriteLine("Enter elements of the matrix separated by spaces:");

        for (int i = 0; i < size; i++)
        {
            string[] row = Console.ReadLine().Split(' ');

            for (int j = 0; j < size; j++)
            {
                matrix[i, j] = int.Parse(row[j]);
            }
        }

        int[,] modifiedMatrix = ModifyMatrix(matrix, size);

        Console.WriteLine("Modified Matrix:");
        PrintMatrix(modifiedMatrix, size);
    }

    static int[,] ModifyMatrix(int[,] matrix, int size)
    {
        int[,] modifiedMatrix = new int[size, size];

        for (int i = 0; i < size; i++)
        {
            for (int j = 0; j < size; j++)
            {
                if (j < i) // Elements to the left of the main diagonal
                {
                    modifiedMatrix[i, j] = 0;
                }
                else // Elements to the right of the main diagonal
                {
                    modifiedMatrix[i, j] = 1;
                }
            }
        }

        return modifiedMatrix;
    }

    static void PrintMatrix(int[,] matrix, int size)
    {
        for (int i = 0; i < size; i++)
        {
            for (int j = 0; j < size; j++)
            {
                Console.Write(matrix[i, j] + " ");
            }
            Console.WriteLine();
        }
    }
}
```

OUTPUT:

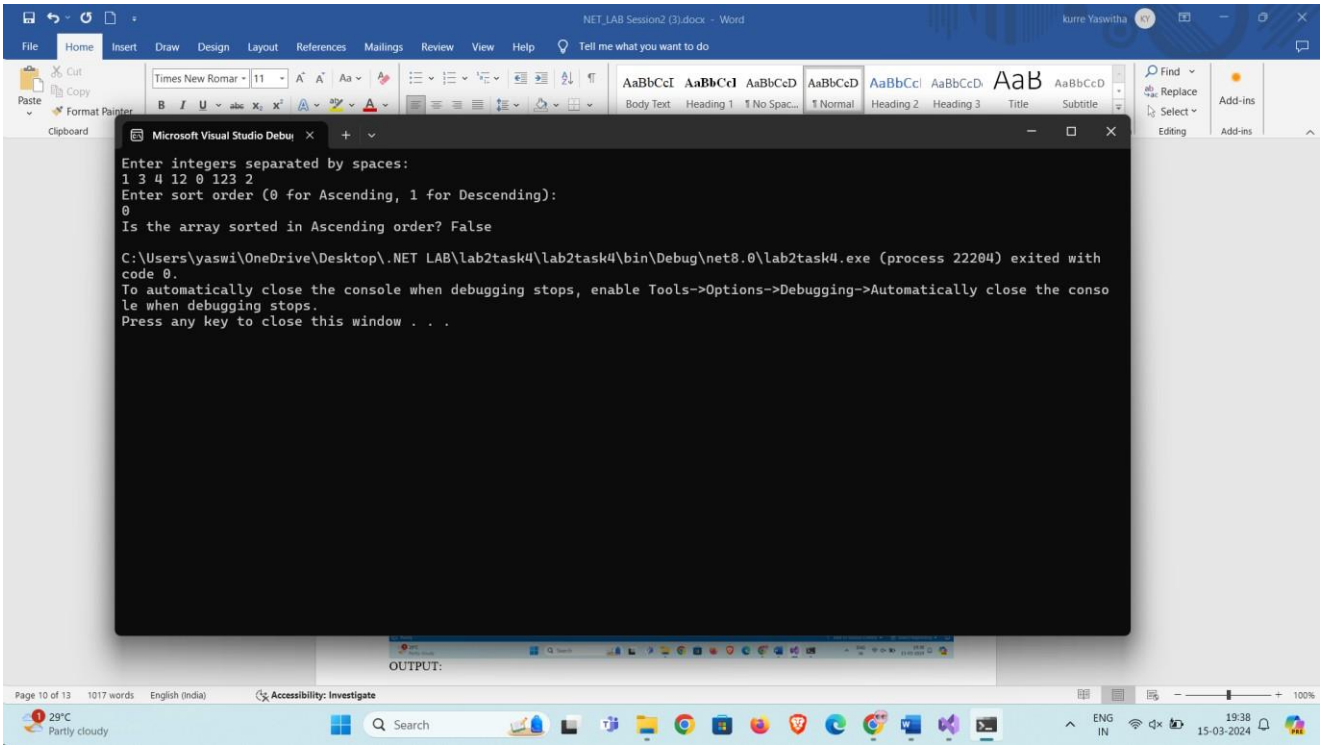


3. Write a C# code to implement the Tasks on Functions?

TASK 1: Create function *IsSorted*, determining whether a given *array* of integer values of arbitrary length is sorted in a given *order* (the order is set up by enum value *SortOrder*). Array and sort order are passed by parameters. Function does not change the array



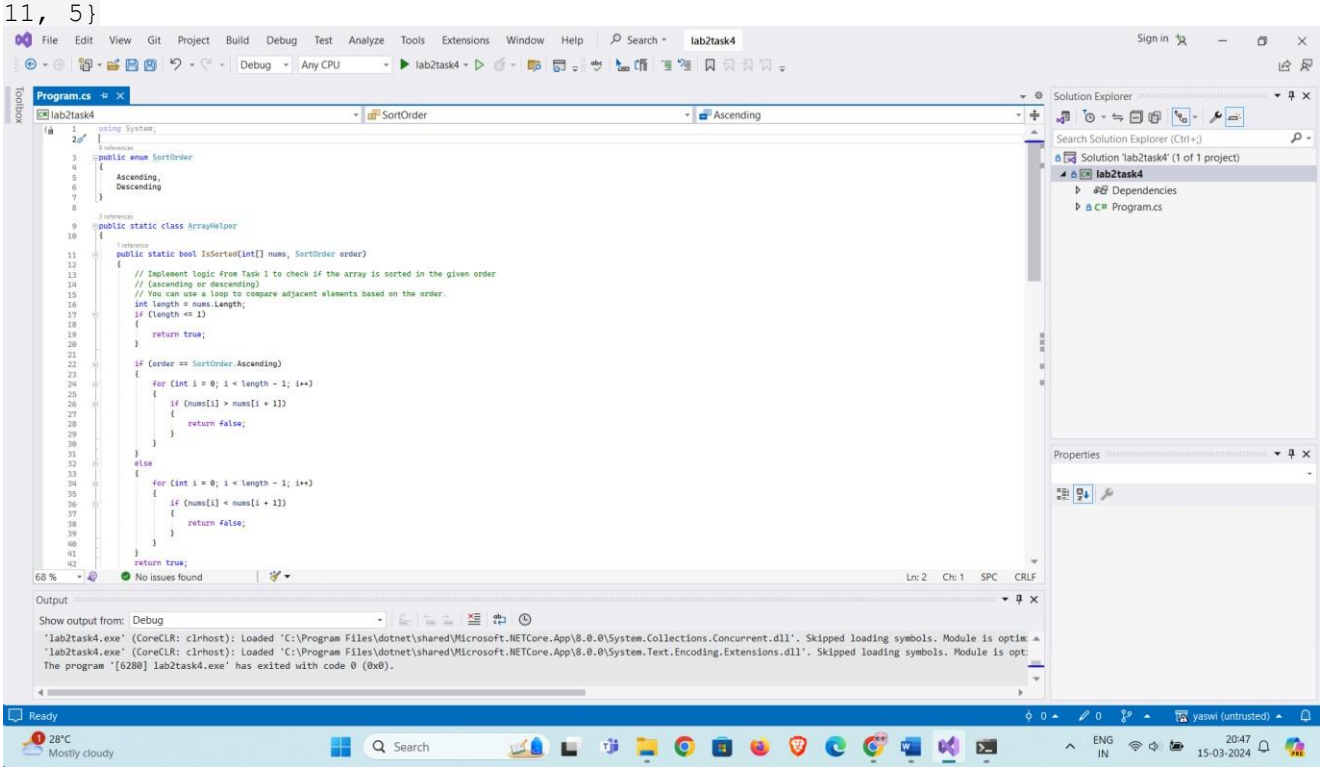
OUTPUT:

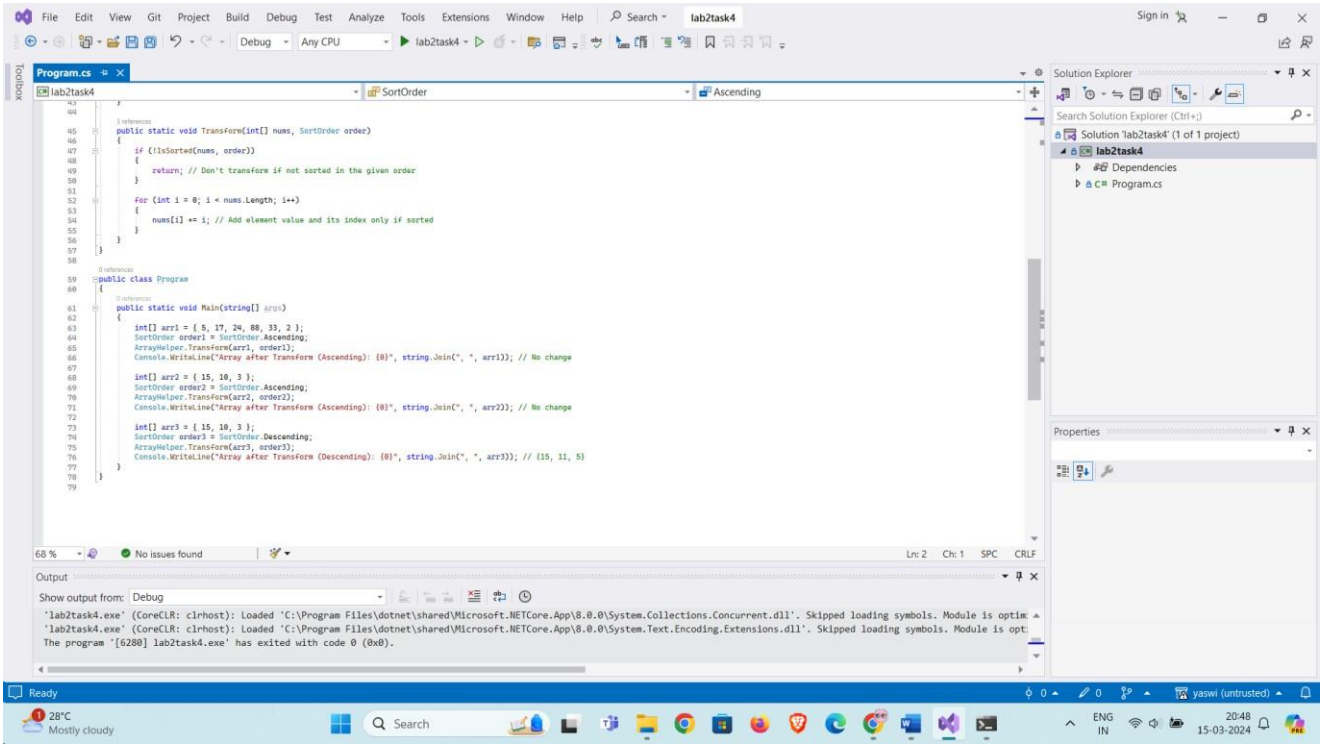


TASK 2: Create function ***Transform***, replacing the value of each element of an integer ***array*** with the sum of this element value and its index, only if the given ***array*** is sorted in the given ***order*** (the order is set up by enum value ***SortOrder***). Array and sort order are passed by parameters. To check, if the array is sorted, the function ***IsSorted*** from the Task 1 is called.

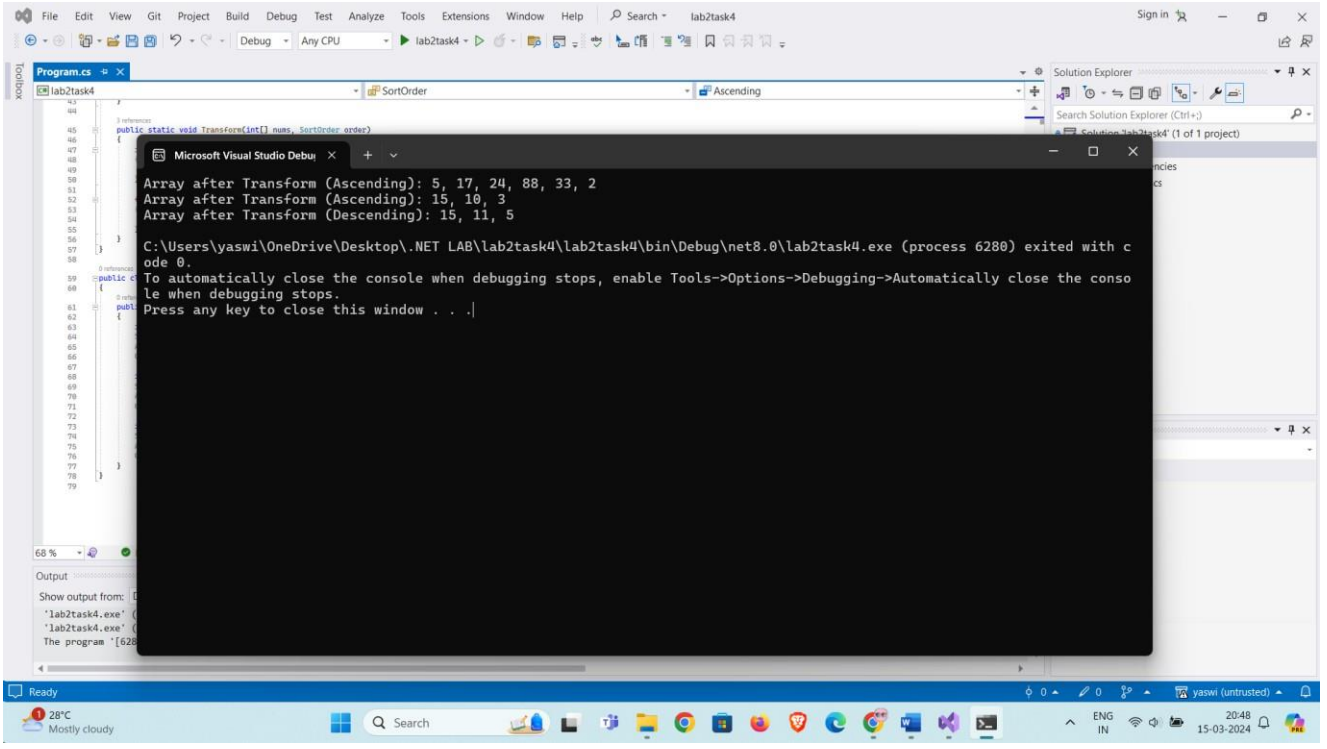
Example

```
For {5, 17, 24, 88, 33, 2} and "ascending" sort order values in the array do not change;
For {15, 10, 3} and "ascending" sort order values in the array do not change;
For {15, 10, 3} and "descending" sort order the values in the array change to {15, 11, 5}
```





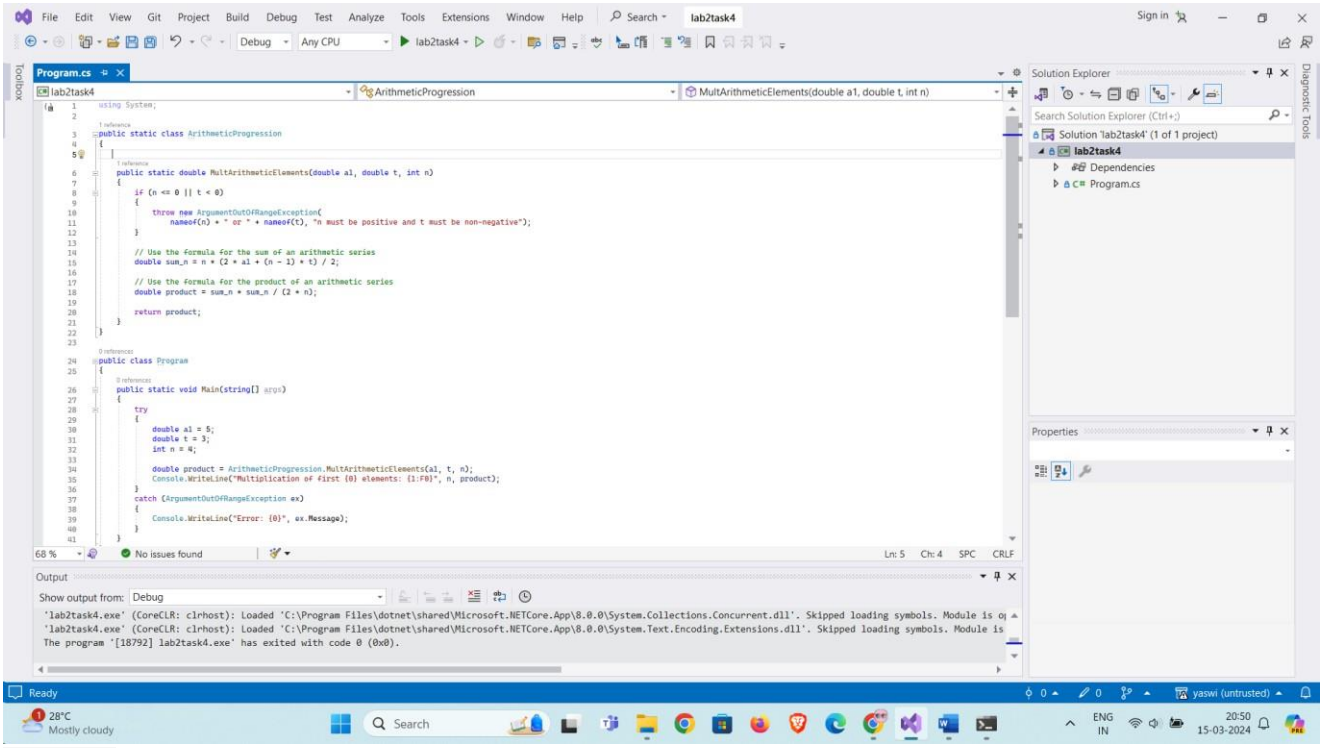
OUTPUT:



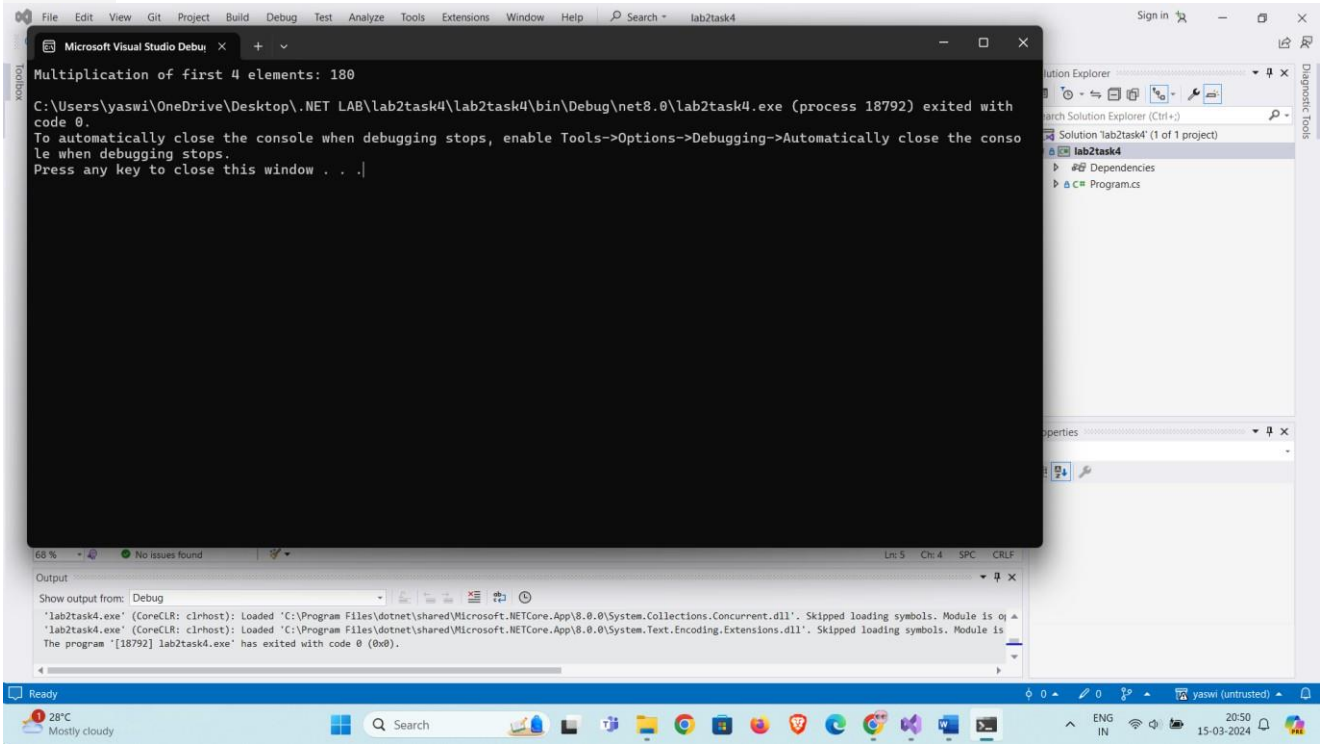
TASK 3: Create function ***MultArithmeticElements***, which determines the multiplication of a given number of first ***n*** elements of arithmetic progression of real numbers with a given initial element of progression ***a(1)*** and progression step ***t***. a(n) is calculated by the formula a(n+1) = a(n) + t.

Example

```
For a(1) = 5, t = 3, n = 4  multiplication equals to 5*8*11*14 = 6160
```



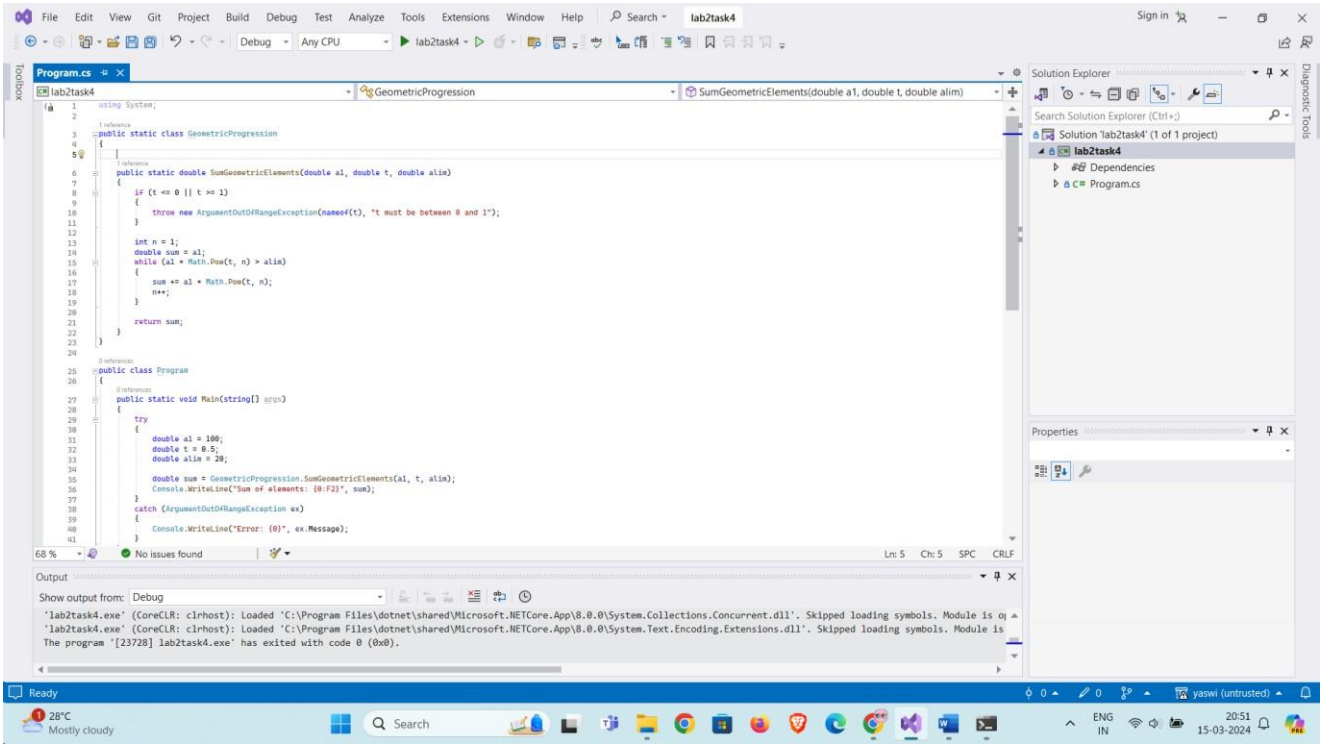
OUTPUT:



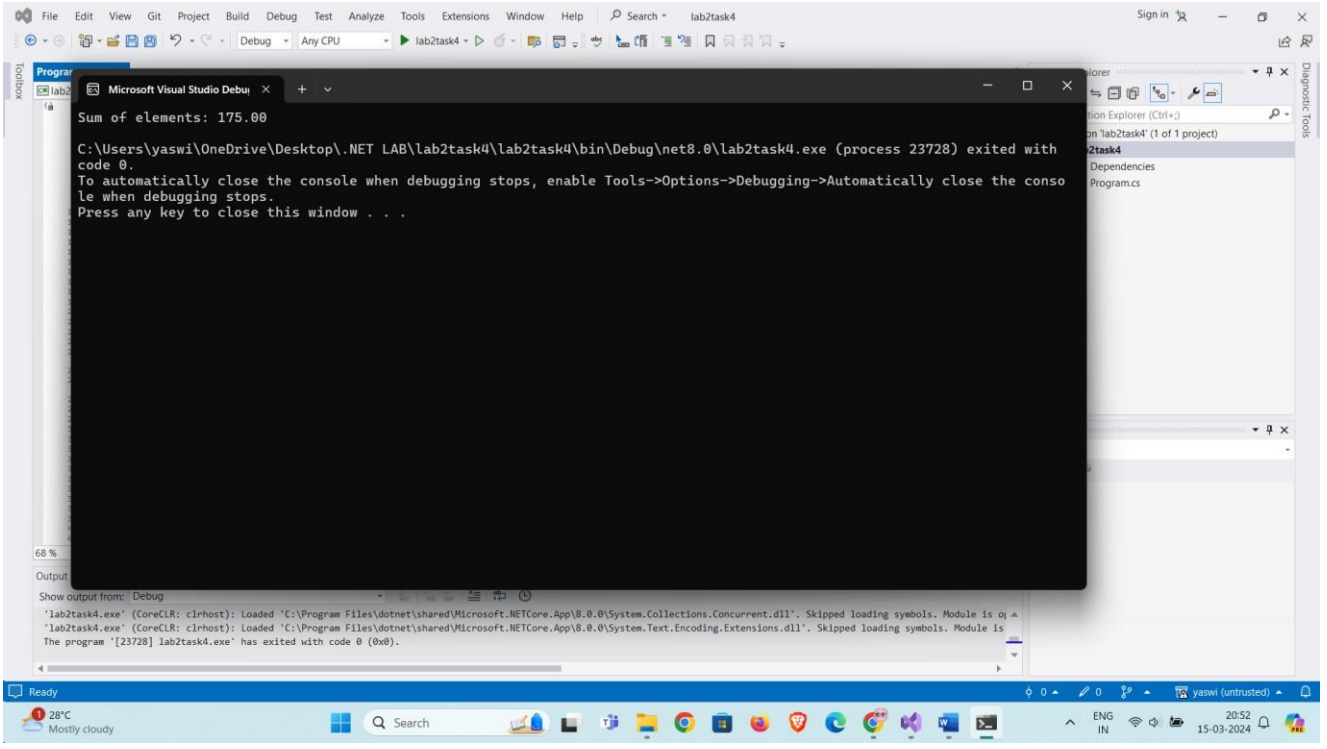
TASK 4: Create function ***SumGeometricElements***, determining the sum of the first elements of a decreasing geometric progression of real numbers with a given initial element of a progression ***a(1)***) and a given progression step ***t***, while the last element must be greater than a given ***alim***. an is calculated by the formula a(n+1) = a(n) * t, 0<t<1.

Example

```
For a progression, where a(1) = 100, and t = 0.5, the sum of the
first elements, grater than alim = 20, equals to 100+50+25 = 175
```

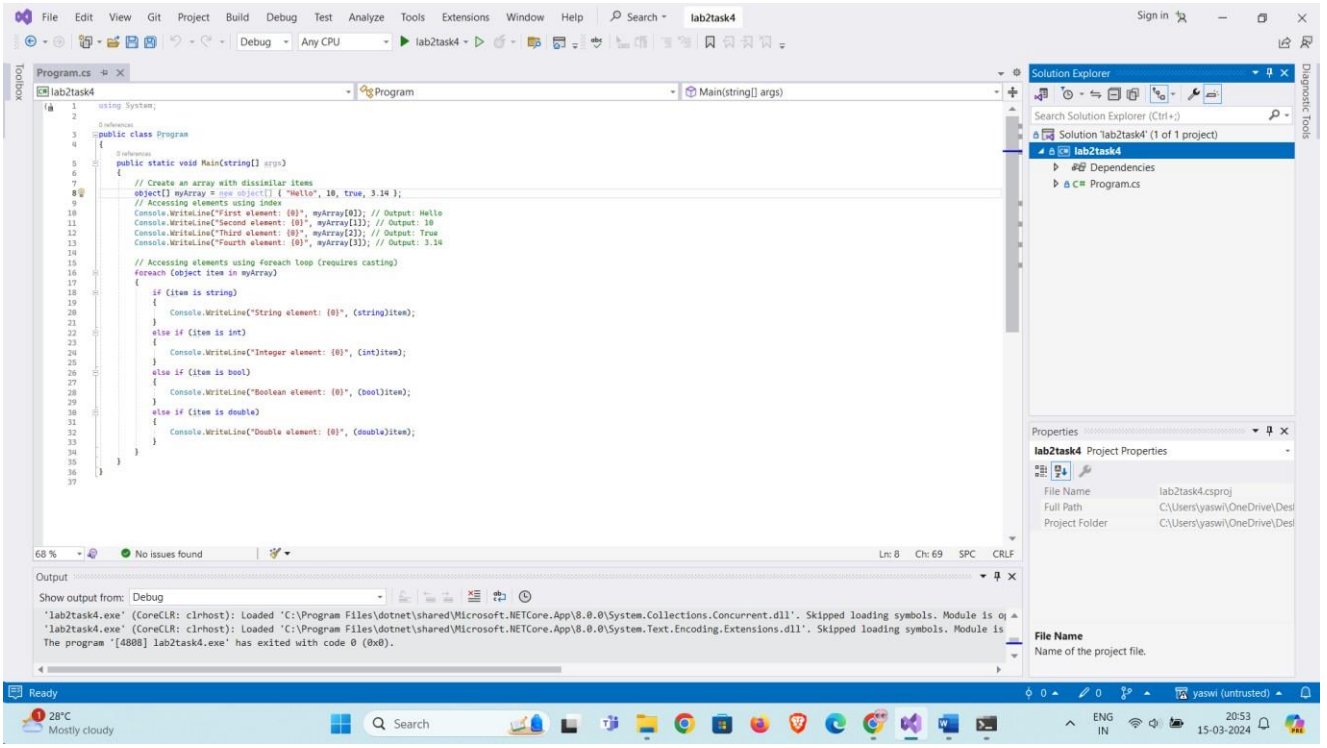


OUTPUT:

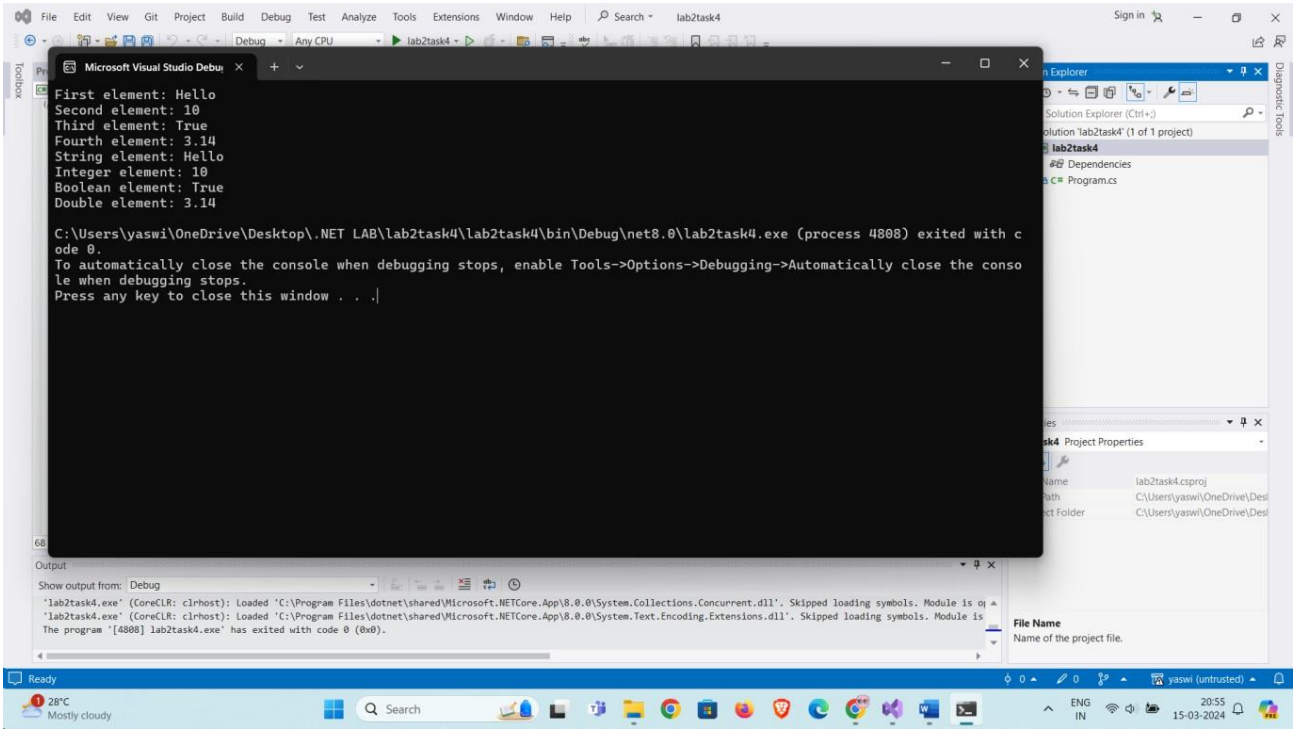


POST-LAB

1. Construct an Array with dissimilar items and access it?


File Edit View Git Project Build Debug Test Analyze Tools Extensions Window Help
lab2task4
Program.cs
using System;
public class Program
{
public static void Main(string[] args)
{
// Create an array with dissimilar items
object[] myArray = new object[] { "Hello", 10, true, 3.14 };
// Accessing elements using index
Console.WriteLine("First element: {0}", myArray[0]); // Output: Hello
Console.WriteLine("Second element: {0}", myArray[1]); // Output: 10
Console.WriteLine("Third element: {0}", myArray[2]); // Output: True
Console.WriteLine("Fourth element: {0}", myArray[3]); // Output: 3.14
// Accessing elements using foreach loop (requires casting)
foreach (object item in myArray)
{
if (item is string)
{
Console.WriteLine("String element: {0}", (string)item);
}
else if (item is int)
{
Console.WriteLine("Integer element: {0}", (int)item);
}
else if (item is bool)
{
Console.WriteLine("Boolean element: {0}", (bool)item);
}
else if (item is double)
{
Console.WriteLine("Double element: {0}", (double)item);
}
}
}
}
Solution Explorer
Solution 'lab2task4' (1 of 1 project)
lab2task4
Dependencies
Program.cs
Properties
lab2task4 Project Properties
File Name
Name of the project file.
Output
Ready
Search

OUTPUT:


Microsoft Visual Studio Debu
First element: Hello
Second element: 10
Third element: True
Fourth element: 3.14
String element: Hello
Integer element: 10
Boolean element: True
Double element: 3.14
C:\Users\yaswi\OneDrive\Desktop\.NET LAB\lab2task4\lab2task4\bin\Debug\net8.0\lab2task4.exe (process 4808) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the console when debugging stops.
Press any key to close this window . . .
Output
Ready
Search