# Tutorial – 2

1. **Predict and write output for the following code.**

```
using System;
namespace DecisionMaking
{
   class Program
   {
      static void Main(string[] args)
      {
         /* local variable definition */
         int a = 10;

         /* check the boolean condition using if statement */
         if (a < 20)
         {
            /* if condition is true then print the following */
            Console.WriteLine("a is less than 20");
         }
         Console.WriteLine("value of a is : {0}", a);
         Console.ReadLine();
      }
   }
}
```

**Output:**

```
D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>csc TUT_2_1.cs
Microsoft (R) Visual C# Compiler version 4.14.0-3.25279.5 (995f12b6)
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D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>TUT_2_1
a is less than 20
value of a is : 10
```

2. **Write missing statement to get the desired output.**

```
using System;

namespace DecisionMaking
{
```

```
class Program
{
   static void Main(string[] args)
   {
      /* local variable definition */
      int a = 100;

      /* check the boolean condition */
      if (a < 20)
      {
         /* if condition is true then print the following */
          Console.WriteLine("a is less than 20");
      }
      else
      {
         /* if condition is false then print the following */
          Console.WriteLine("a is not less than 20");   // Missing statement-1
      }

      Console.WriteLine("value of a is : {0}", a);      // Missing statement-2
      Console.ReadLine();
   }
  }
}
```

**Output:**

```
D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>csc TUT_2_2.cs
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D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>TUT_2_2
a is not less than 20
value of a is : 100
```

**3. Correct the following code and write output for the corrected code.**

```
using System;

namespace ConsoleApplication1
```

```
{
    class Program
    {
        static void Main(string[] args)
        {
            string firstName = "John";
            string lastName = "Doe";

            Console.WriteLine("Name: " + firstName + " " + lastName);

            Console.WriteLine("Please enter a new first name:");
            firstName = Console.ReadLine();

            Console.WriteLine("New name: " + firstName + " " + lastName);

            Console.ReadLine();
        }
    }
}
```

**Output:**

```
D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>csc TUT_2_3.cs
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D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>TUT_2_3
Name: John Doe
Please enter a new first name:
Mike
New name: Mike Doe
```

4. **Input two number A and B. perform different operations using different operators and different data types available in C#. (Note : Follow all the operators and data types to do above task. Use Online help whenever necessary.)**

```
using System;

namespace OperatorsDemo
{
    class Program
```

```
{
    static void Main(string[] args)
    {
        // Input two numbers
        Console.Write("Enter first number (A): ");
        int A = Convert.ToInt32(Console.ReadLine());

        Console.Write("Enter second number (B): ");
        int B = Convert.ToInt32(Console.ReadLine());

        // Arithmetic Operators
        Console.WriteLine("\n--- Arithmetic Operators ---");
        Console.WriteLine($"A + B = {A + B}");
        Console.WriteLine($"A - B = {A - B}");
        Console.WriteLine($"A * B = {A * B}");
        Console.WriteLine($"A / B = {(float)A / B}"); // type casting
        Console.WriteLine($"A % B = {A % B}");

        // Relational Operators
        Console.WriteLine("\n--- Relational Operators ---");
        Console.WriteLine($"A == B : {A == B}");
        Console.WriteLine($"A != B : {A != B}");
        Console.WriteLine($"A > B : {A > B}");
        Console.WriteLine($"A < B : {A < B}");
        Console.WriteLine($"A >= B : {A >= B}");
        Console.WriteLine($"A <= B : {A <= B}");

        // Logical Operators (using bool)
        bool condition1 = (A > 0);
        bool condition2 = (B > 0);

        Console.WriteLine("\n--- Logical Operators ---");
        Console.WriteLine($"condition1 && condition2 : {condition1 && condition2}");
        Console.WriteLine($"condition1 || condition2 : {condition1 || condition2}");
        Console.WriteLine($"!condition1 : {!condition1}");

        // Bitwise Operators
        Console.WriteLine("\n--- Bitwise Operators ---");
        Console.WriteLine($"A & B = {A & B}");
        Console.WriteLine($"A | B = {A | B}");
        Console.WriteLine($"A ^ B = {A ^ B}");
        Console.WriteLine($"~A = {~A}");
        Console.WriteLine($"A << 1 = {A << 1}");
```

```
            Console.WriteLine($"A >> 1 = {A >> 1}");

            // Assignment Operators
            Console.WriteLine("\n--- Assignment Operators ---");
            int C = A;
            C += B;
            Console.WriteLine($"C += B : {C}");
            C -= B;
            Console.WriteLine($"C -= B : {C}");
            C *= B;
            Console.WriteLine($"C *= B : {C}");
            C /= (B == 0 ? 1 : B);  // avoid divide by zero
            Console.WriteLine($"C /= B : {C}");

            // Unary Operators
            Console.WriteLine("\n--- Unary Operators ---");
            int X = A;
            Console.WriteLine($"++X = {++X}"); // pre-increment
            Console.WriteLine($"--X = {--X}"); // pre-decrement

            // Different Data Types
            Console.WriteLine("\n--- Different Data Types ---");
            double d = (double)A / B;
            decimal dec = (decimal)A / B;
            char ch = 'C';
            string str = "Hello C#";

            Console.WriteLine($"Double value (A/B): {d}");
            Console.WriteLine($"Decimal value (A/B): {dec}");
            Console.WriteLine($"Character value: {ch}");
            Console.WriteLine($"String value: {str}");

            Console.ReadLine();
        }
    }
}
```

**Output:**

```
D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>TUT_2_4
Enter first number (A): 1
Enter second number (B): 2

--- Arithmetic Operators ---
A + B = 3
A - B = -1
A * B = 2
A / B = 0.5
A % B = 1

--- Relational Operators ---
A == B : False
A != B : True
A > B : False
A < B : True
A >= B : False
A <= B : True
--- Logical Operators ---
condition1 && condition2 : True
condition1 || condition2 : True
!condition1 : False

--- Bitwise Operators ---
A & B = 0
A | B = 3
A ^ B = 3
~A = -2
A << 1 = 2
A >> 1 = 0

--- Assignment Operators ---
C += B : 3
C -= B : 1
C *= B : 2
C /= B : 1

--- Unary Operators ---
++X = 2
--X = 1

--- Different Data Types ---
Double value (A/B): 0.5
Decimal value (A/B): 0.5
Character value: C
String value: Hello C#
```

**5. Rearrange the given code to correct the program. The resultant program will be to enter 5 elements into an array and print sum of these elements.**

```
using System;

namespace ConsoleApplication1
{
```

```
class Program
{
   static void Main(string[] args)
   {
      int[] arr = new int[5];   // declare array
      int sum = 0;              // initialize sum

      // Input loop
      for (int i = 0; i < 5; i++)
      {
          Console.Write("Enter Element {0}: ", i);
         string str = Console.ReadLine();
          arr[i] = Convert.ToInt32(str);
      }

      // Sum loop
      for (int i = 0; i < 5; i++)
      {
          sum = sum + arr[i];
      }

      Console.WriteLine("Sum of Elements : {0}", sum);
      Console.Read();
   }
  }
}
```

**Output:**

```
D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>csc TUT_2_5.cs
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D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>TUT_2_5
Enter Element 0: 1
Enter Element 1: 2
Enter Element 2: 3
Enter Element 3: 4
Enter Element 4: 5
Sum of Elements : 15
```

6. **Write missing statement to get the desired output.**

```
using System;

public class Hello3
```

```
{
    public static void Main(string[] args)
    {
        Console.WriteLine("Hello, World!");
        Console.WriteLine("You entered the following {0} command line arguments:",
          args.Length);

        for (int i = 0; i < args.Length; i++)
        {
            Console.WriteLine(args[i]);        // Missing statement-2
        }                                      // Missing statement-3
                                               // Missing statement-4
    }
}
```

**Output:**

```
D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>csc TUT_2_6.cs
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D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>TUT_2_6
Hello, World!
You entered the following 0 command line arguments:
```

**7. Predict and write the output of the given code.**

```
using System;

namespace CalculatorApplication
{
   class NumberManipulator
   {
      public void swap(ref int x, ref int y)
      {
         int temp;
         temp = x;
         x = y;
         y = temp;
      }
   }
```

```
class TestRef
{
   static void Main(string[] args)
   {
      NumberManipulator n = new NumberManipulator();

      int a = 100;
      int b = 200;

      Console.WriteLine("Before swap, value of a : {0}", a);
      Console.WriteLine("Before swap, value of b : {0}", b);

      n.swap(ref a, ref b);

      Console.WriteLine("After swap, value of a : {0}", a);
      Console.WriteLine("After swap, value of b : {0}", b);

      Console.ReadLine();
   }
  }
}
```

**Output:**

```
D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>csc TUT_2_7.cs
Microsoft (R) Visual C# Compiler version 4.14.0-3.25279.5 (995f12b6)
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D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>TUT_2_7
Before swap, value of a : 100
Before swap, value of b : 200
After swap, value of a : 200
After swap, value of b : 100
```

**8. Find out error code and correct it. Write the output of the corrected code.**

```
using System;

namespace CalculatorApplication
{
   class NumberManipulator
   {
```

```
        public int getValues(out int x, out int y, out int z)
        {
            Console.WriteLine("Enter the first value: ");
            x = Convert.ToInt32(Console.ReadLine());

            Console.WriteLine("Enter the second value: ");
            y = Convert.ToInt32(Console.ReadLine());

            Console.WriteLine("Enter the third value: ");
            z = Convert.ToInt32(Console.ReadLine());

            int sum = x + y + z;
            return sum;
        }
    }

    class TestOut
    {
        static void Main(string[] args)
        {
            NumberManipulator n = new NumberManipulator();

            /* local variable definition */
            int a, b, c, sum;

            /* calling a function to get the values */
            sum = n.getValues(out a, out b, out c);

            Console.WriteLine("After method call, value of a : {0}", a);
            Console.WriteLine("After method call, value of b : {0}", b);
            Console.WriteLine("After method call, value of c : {0}", c);
            Console.WriteLine("Sum : {0}", sum);

            Console.ReadLine();
        }
    }
}
```

**Output:**

```
D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>TUT_2_8
Enter the first value:
12
Enter the second value:
34
Enter the third value:
54
After method call, value of a : 12
After method call, value of b : 34
After method call, value of c : 54
Sum : 100
```

9. **Given an array A containing 2*N+2 positive numbers, out of which 2*N numbers exist in pairs whereas the other two number occur exactly once and are distinct. Find the other two numbers.**

```
using System;

class DistinctNumbers
{
    public static void FindTwoNumbers(int[] arr)
    {
        int xorAll = 0;

        // Step 1: XOR of all elements
        foreach (int num in arr)
            xorAll ^= num;

        // Step 2: Get rightmost set bit
        int setBit = xorAll & -xorAll;

        int num1 = 0, num2 = 0;

        // Step 3: Divide into two groups
        foreach (int num in arr)
        {
            if ((num & setBit) != 0)
                num1 ^= num;
            else
                num2 ^= num;
        }
```

```
            Console.WriteLine($"{num1} {num2}");
        }

        static void Main(string[] args)
        {
            // Example 1
            int[] arr1 = { 1, 2, 3, 2, 1, 4 };
            FindTwoNumbers(arr1);   // Output: 3 4

            // Example 2
            int[] arr2 = { 2, 1, 3, 2 };
            FindTwoNumbers(arr2);   // Output: 1 3

            Console.ReadLine();
        }
    }
```

**Output:**

```
D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>csc TUT_2_9.cs
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D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>TUT_2_9
3 4
3 1
```

**10. Given a matrix mat[][] of size N x M, where every row and column is sorted in increasing order, and a number X is given. The task is to find whether element X is present in the matrix or not.**

```
using System;

class MatrixSearch
{
    public static int matSearch(int[,] mat, int N, int M, int X)
    {
        int i = 0, j = M - 1;

        while (i < N && j >= 0)
        {
```

```
            if (mat[i, j] == X)
                return 1;
            else if (mat[i, j] > X)
                j--;  // move left
            else
                i++;  // move down
        }

        return 0;
    }

    static void Main(string[] args)
    {
        // Example 1
        int[,] mat1 = {
            {3, 30, 38},
            {44, 52, 54},
            {57, 60, 69}
        };
        Console.WriteLine(matSearch(mat1, 3, 3, 62)); // Output: 0

        // Example 2
        int[,] mat2 = { { 18, 21, 27, 38, 55, 67 } };
        Console.WriteLine(matSearch(mat2, 1, 6, 55)); // Output: 1

        Console.ReadLine();
    }
}
```

**Output:**

```
D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>csc TUT_2_10.cs
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D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>TUT_2_10
0
1
```

**11. Write a program to find the sum of N elements of an Array.**

```
using System;

class ArraySum
{
   static void Main(string[] args)
   {
      Console.Write("Enter number of elements (N): ");
      int N = Convert.ToInt32(Console.ReadLine());

      int[] arr = new int[N];
      int sum = 0;

      // Input elements
      for (int i = 0; i < N; i++)
      {
         Console.Write("Enter element {0}: ", i + 1);
         arr[i] = Convert.ToInt32(Console.ReadLine());
         sum += arr[i];  // add to sum directly
      }

      Console.WriteLine("Sum of array elements = " + sum);
      Console.ReadLine();
   }
}
```

**Output:**

```
D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>csc TUT_2_11.cs
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D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>TUT_2_11
Enter number of elements (N): 3
Enter element 1: 23
Enter element 2: 23
Enter element 3: 12
Sum of array elements = 58
```

**12. Write a program to find the element from an Array and print 1 if element is found else print 0.**

```
using System;

class ArraySearch
{
    static void Main(string[] args)
    {
        Console.Write("Enter number of elements (N): ");
        int N = Convert.ToInt32(Console.ReadLine());

        int[] arr = new int[N];

        // Input elements
        for (int i = 0; i < N; i++)
        {
            Console.Write("Enter element {0}: ", i + 1);
            arr[i] = Convert.ToInt32(Console.ReadLine());
        }

        Console.Write("Enter element to search: ");
        int X = Convert.ToInt32(Console.ReadLine());

        // Search
        int found = 0;
        for (int i = 0; i < N; i++)
        {
            if (arr[i] == X)
            {
                found = 1;
                break;
            }
        }

        Console.WriteLine(found);
        Console.ReadLine();
    }
}
```

**Output:**

```
D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>csc TUT_2_12.cs
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D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>TUT_2_12
Enter number of elements (N): 2
Enter element 1: 21
Enter element 2: 32
Enter element to search: 2
0
2
```

**13. Write a Program that will accept the amount and find how many minimum no of notes you required for that.**

```
using System;

class CurrencyNotes
{
    static void Main(string[] args)
    {
        Console.Write("Enter the amount: ");
        int amount = Convert.ToInt32(Console.ReadLine());

        int[] notes = { 2000, 500, 200, 100, 50, 20, 10, 5, 2, 1 };
        int[] count = new int[notes.Length];

        int remaining = amount;

        for (int i = 0; i < notes.Length; i++)
        {
            if (remaining >= notes[i])
            {
                count[i] = remaining / notes[i];
                remaining = remaining % notes[i];
            }
        }

        Console.WriteLine("Minimum notes required for Rs." + amount + ":");
        for (int i = 0; i < notes.Length; i++)
        {
            Console.WriteLine("Notes of Rs.{0} = {1}", notes[i], count[i]);
```

```
        }

        Console.ReadLine();
    }
}
```

**Output:**

```
D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>csc TUT_2_13.cs
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D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>TUT_2_13
Enter the amount: 5748
Minimum notes required for Rs.5748:
Notes of Rs.2000 = 2
Notes of Rs.500 = 3
Notes of Rs.200 = 1
Notes of Rs.100 = 0
Notes of Rs.50 = 0
Notes of Rs.20 = 2
Notes of Rs.10 = 0
Notes of Rs.5 = 1
Notes of Rs.2 = 1
Notes of Rs.1 = 1
```

**14. Write a Program to find the eligibility of admission for a professional course.**

```
using System;

class AdmissionEligibility
{
    static void Main(string[] args)
    {
        Console.Write("Input the marks obtained in Maths : ");
        int maths = Convert.ToInt32(Console.ReadLine());

        Console.Write("Input the marks obtained in Physics : ");
        int physics = Convert.ToInt32(Console.ReadLine());

        Console.Write("Input the marks obtained in Chemistry : ");
        int chemistry = Convert.ToInt32(Console.ReadLine());

        int total = maths + physics + chemistry;
        int totalMP = maths + physics;

        if (maths >= 65 && physics >= 55 && chemistry >= 50 &&
            (total >= 180 || totalMP >= 140))
```

```
        {
            Console.WriteLine("The candidate is eligible for admission.");
        }
        else
        {
            Console.WriteLine("The candidate is not eligible for admission.");
        }

        Console.ReadLine();
    }
}
```

**Output:**

```
D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>csc TUT_2_14.cs
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D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>TUT_2_14
Input the marks obtained in Maths : 77
Input the marks obtained in Physics : 88
Input the marks obtained in Chemistry : 78
The candidate is eligible for admission.
```

**15. Write a Program which accepts name from the user and prints the same.**

```
using System;

class PrintName
{
    static void Main(string[] args)
    {
        Console.Write("Enter your name: ");
        string name = Console.ReadLine();   // Accept name from user

        Console.WriteLine("You entered: " + name);  // Print the name

        Console.ReadLine();
    }
}
```

**Output:**

```
D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>csc TUT_2_15.cs
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D:\24SOECE13003-BHOOMIN_GORASIYA\.Net>TUT_2_15
Enter your name: RK UNIVERSITY
You entered: RK UNIVERSITY
```