

- 1) Describe the enumerations programming constructs, which provides a human-readable form of a series of related constant values in C#..

using System;

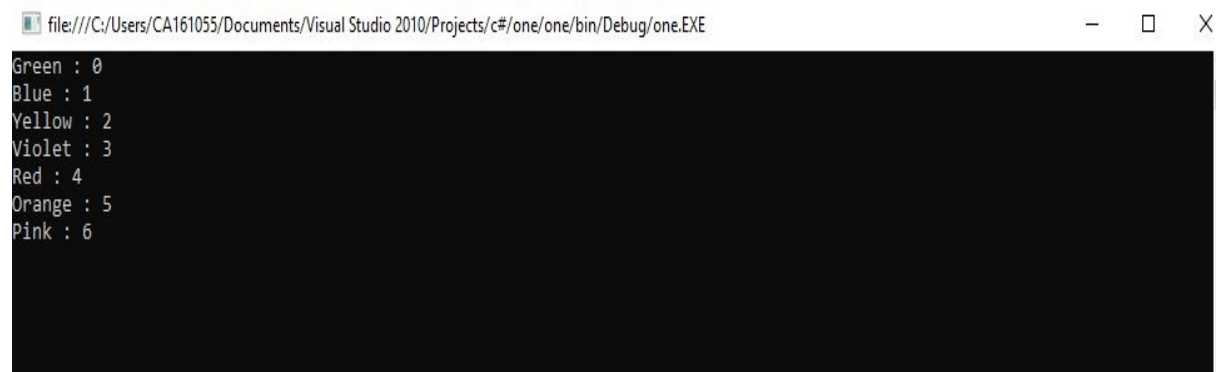
using System.Collections.Generic;

using System.Linq;

using System.Text;

```
namespace EnumerationDemo
{
    class ProgramOne
    {
        enum Colors
        {
            Green,
            Blue,
            Yellow,
            Violet,
            Red,
            Orange,
            Pink
        }

        static void Main(string[] args)
        {
            foreach (var color in Enum.GetValues(typeof(Colors)))
            {
                Console.WriteLine("{0} : {1}", color, (int)color);
            }
            Console.Read();
        }
    }
}
```

OUTPUT

A screenshot of a Windows application window titled "file:///C:/Users/CA161055/Documents/Visual Studio 2010/Projects/c#/one/one/bin/Debug/one.EXE". The window contains a black console area with white text displaying the following output:

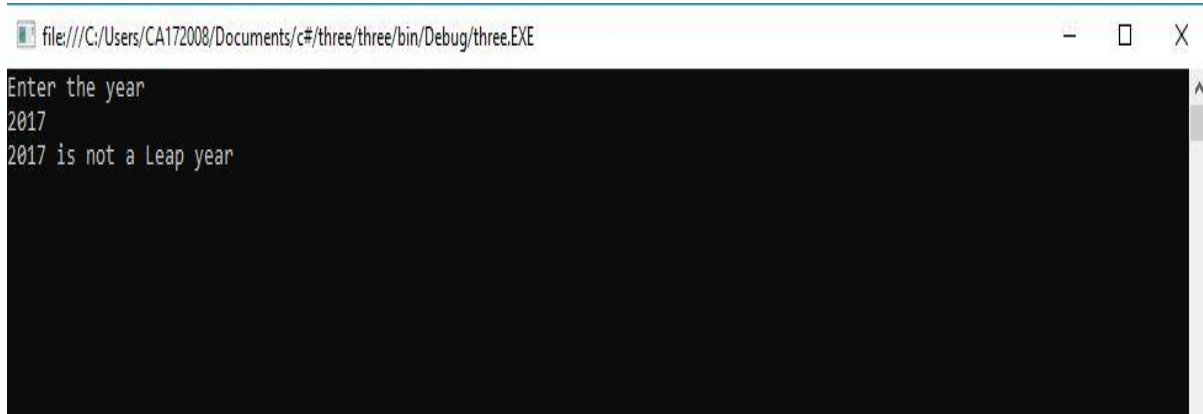
```
Green : 0  
Blue : 1  
Yellow : 2  
Violet : 3  
Red : 4  
Orange : 5  
Pink : 6
```

2) Check Whether the Entered Year is a Leap Year or Not

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace ProgramTwo
{
    class Program
    {
        static void Main(string[] args)
        {
            try {
                Console.Write("Enter The Year : \n");
                long year = Convert.ToInt64(Console.ReadLine());
                Console.WriteLine("\n-----");
                if (year % 400 == 0) {
                    Console.WriteLine("\t{0} is a Leap Year", year);
                }
                else if (year % 100 == 0) {
                    Console.WriteLine("\t{0} is not a Leap Year", year);
                }
                else if (year % 4 == 0)
                {
                    Console.WriteLine("\t{0} is a Leap Year", year);
                }
                else {
                    Console.WriteLine("\t{0} is not a Leap Year", year);
                }
            }
            catch(Exception ex) {
                Console.WriteLine("Enter valid year");
            }

            Console.ReadKey();
        }
    }
}
```

OUTPUT

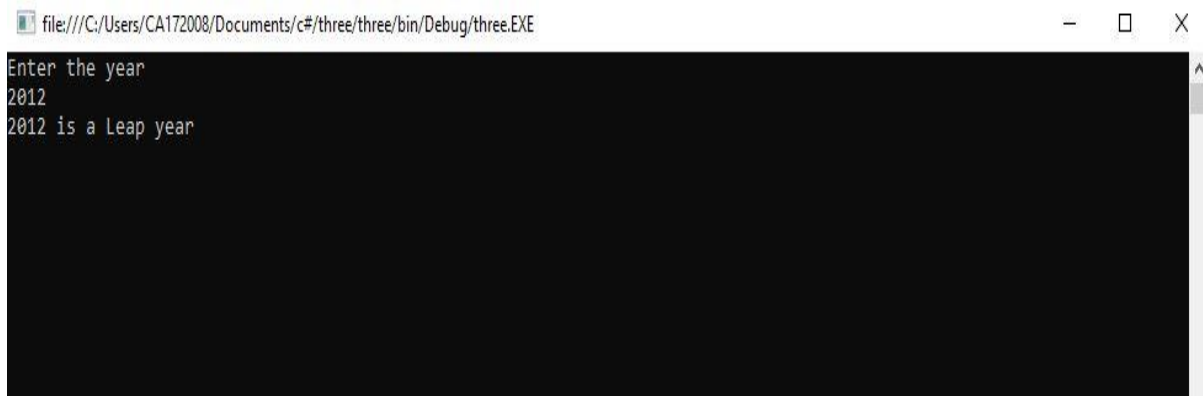
A screenshot of a Windows console window titled "file:///C:/Users/CA172008/Documents/c#/three/three/bin/Debug/three.EXE". The console has a black background with white text. It displays the prompt "Enter the year", followed by the user input "2017", and the program output "2017 is not a Leap year".

```
file:///C:/Users/CA172008/Documents/c#/three/three/bin/Debug/three.EXE
Enter the year
2017
2017 is not a Leap year
```



A screenshot of a Windows console window titled "file:///C:/Users/CA172008/Documents/c#/three/three/bin/Debug/three.EXE". The console has a black background with white text. It displays the prompt "Enter the year", followed by the user input "2002", and the program output "2002 is not a Leap year".

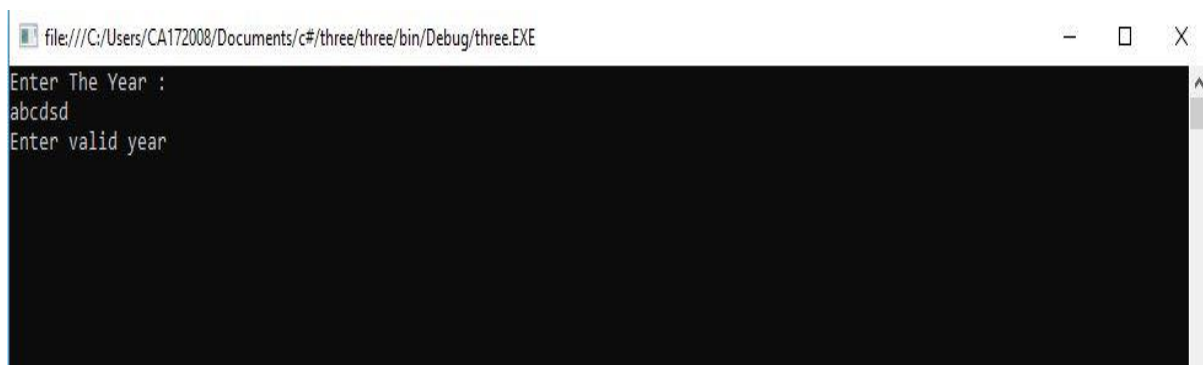
```
file:///C:/Users/CA172008/Documents/c#/three/three/bin/Debug/three.EXE
Enter the year
2002
2002 is not a Leap year
```



```
file:///C:/Users/CA172008/Documents/c#/three/three/bin/Debug/three.EXE
Enter the year
2012
2012 is a Leap year
```



```
file:///C:/Users/CA172008/Documents/c#/three/three/bin/Debug/three.EXE
Enter the year
2008
2008 is a Leap year
```



```
file:///C:/Users/CA172008/Documents/c#/three/three/bin/Debug/three.EXE
Enter The Year :
abcdsd
Enter valid year
```

3) Program to display the addition using the windows application.

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Windows.Forms;

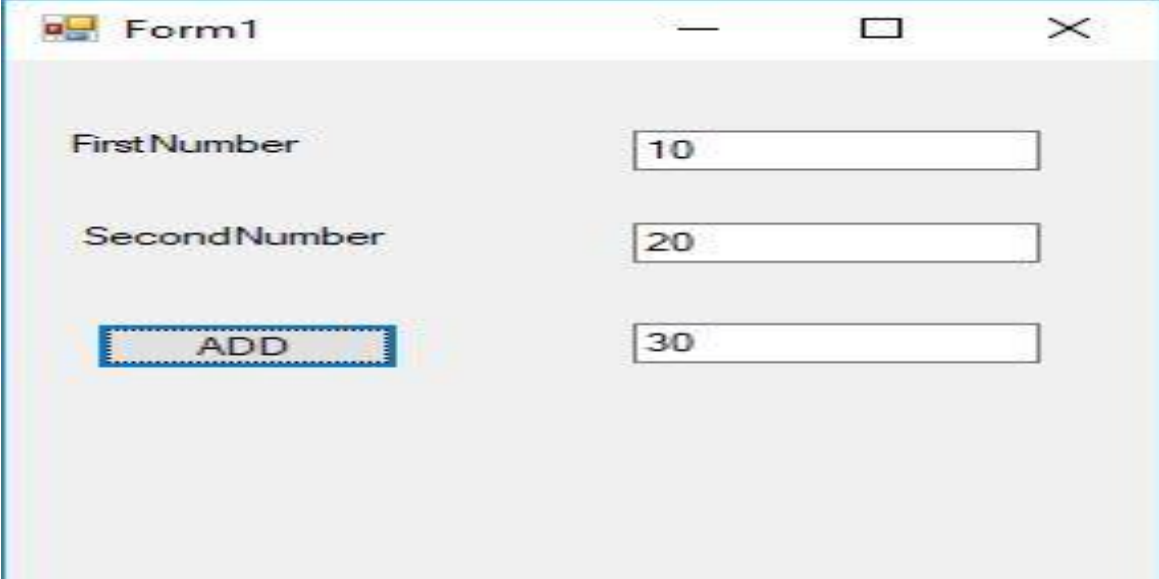
namespace three
{
    public partial class Form1 : Form
    {
        public Form1()
        {
            InitializeComponent();
        }

        private void button1_Click(object sender, EventArgs e)
        {
            int num1 = Int16.Parse(textBox1.Text);
            int num2 = Int16.Parse(textBox2.Text);

            int sum = num1 + num2;

            textBox3.Text = "sum of two number :" + sum;
        }
    }
}
```

OUTPUT

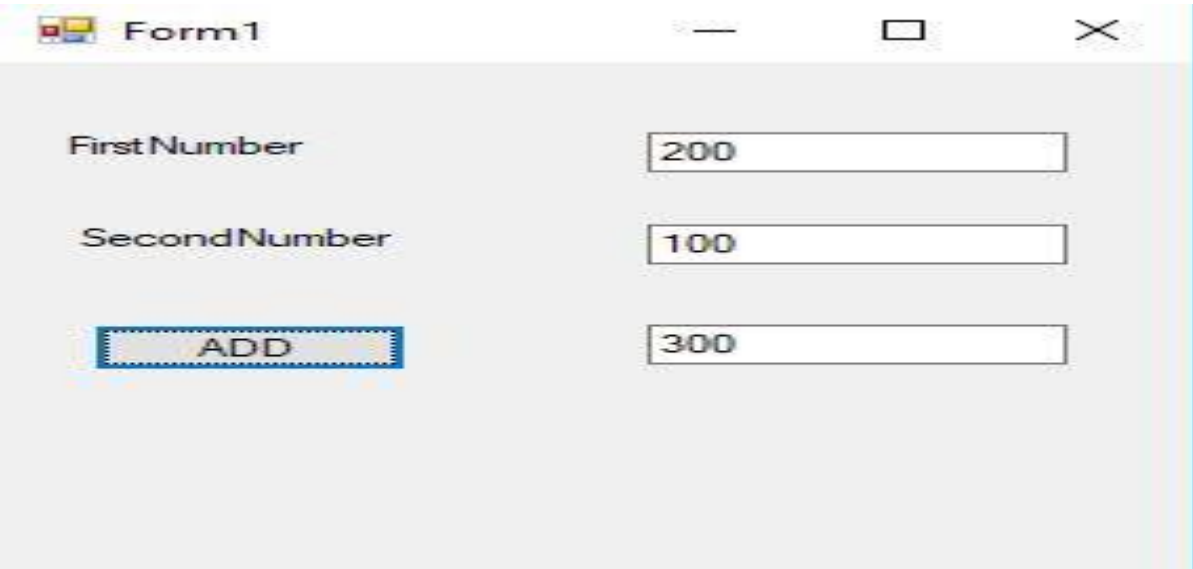


Form1

FirstNumber 10

SecondNumber 20

ADD



Form1

FirstNumber 200

SecondNumber 100

ADD

300

The screenshot shows a Windows Form titled "Form1" with a standard Windows title bar (minimize, maximize, close buttons). The form has a light gray background. It contains three text boxes and one button. The first text box is labeled "FirstNumber" and contains the value "30". The second text box is labeled "SecondNumber" and contains the value "50". The third text box is empty and contains the value "80". A button labeled "ADD" is positioned to the left of the third text box.

Label	Value
FirstNumber	30
SecondNumber	50
	80

The screenshot shows the same Windows Form titled "Form1" after the "ADD" button has been clicked. The "FirstNumber" text box still contains "60". The "SecondNumber" text box still contains "50". The third text box now contains the value "110", which is the sum of 60 and 50. The "ADD" button is still present and highlighted.

Label	Value
FirstNumber	60
SecondNumber	50
	110

The screenshot shows a Windows Form titled "Form1" with a standard Windows title bar (minimize, maximize, close buttons). The form contains three text boxes and one button. The first text box is labeled "FirstNumber" and contains the value "60". The second text box is labeled "SecondNumber" and contains the value "10". Below the "SecondNumber" label is a button labeled "ADD". To the right of the "ADD" button is a third text box containing the value "70".

Label	Value
FirstNumber	60
SecondNumber	10
ADD	
	70

4) Program to display the addition, subtraction, multiplication and division of two number using console applications.

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace ProgramFive
{
    class Program
    {
        static void Main(string[] args)
        {
            double num1, num2;
            double sum, sub, mul, div;

            Console.WriteLine("Enter the two numbers");
            num1 = Double.Parse(Console.ReadLine());
            num2 = Double.Parse(Console.ReadLine());

            sum = num1 + num2;
            sub = num1 - num2;
            mul = num1 * num2;
            div = num1 / num2;
            Console.WriteLine();
            Console.WriteLine("-----");
            Console.WriteLine("Addition: {0}", sum);
            Console.WriteLine("Substraction: {0}", sub);
            Console.WriteLine("Multiplication: {0}", mul);
            Console.WriteLine("Division: {0}", div);
            Console.WriteLine("-----");
            Console.ReadLine();
        }
    }
}
```

OUTPUT

```
file:///C:/Users/CA172008/Documents/c#/five/five/bin/Debug/five.EXE
Enter the two numbers
50
60

-----
Addition: 110
Substraction: -10
Multiplication: 3000
Division: 0.8333333333333333
-----
```

```
file:///C:/Users/CA172008/Documents/c#/five/five/bin/Debug/five.EXE
Enter the two numbers
10
60

-----
Addition: 70
Substraction: -50
Multiplication: 600
Division: 0.1666666666666667
-----
```

```
file:///C:/Users/CA172008/Documents/c#/five/five/bin/Debug/five.EXE
Enter the two numbers
80
100

-----
Addition: 180
Substraction: -20
Multiplication: 8000
Division: 0.8
-----
```



```
file:///C:/Users/CA172008/Documents/c#/five/five/bin/Debug/five.EXE
Enter the two numbers
30
40
-----
Addition: 70
Substraction: -10
Multiplication: 1200
Division: 0.75
-----
```




```
file:///C:/Users/CA172008/Documents/c#/five/five/bin/Debug/five.EXE
Enter the two numbers
20
40
-----
Addition: 60
Substraction: -20
Multiplication: 800
Division: 0.5
-----
```

5) Program to display the first 10 natural numbers and their sum using console application

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace ProgramSix
{
    class Program
    {
        static void Main(string[] args)
        {
            int sum = 0;
            Console.WriteLine("-----");
            Console.WriteLine("First 10 natural numbers");
            Console.WriteLine("-----");

            for (int i = 1; i <= 10; i++)
            {
                sum += i;
                Console.WriteLine(i);
            }
            Console.WriteLine("-----");
            Console.WriteLine("Sum: {0}", sum);
            Console.WriteLine("-----");
            Console.ReadLine();
        }
    }
}
```

OUTPUT file:///C:/Users/CA172008/Documents/c#/six/six/bin/Debug/six.EXE

```
-----  
First 10 natural numbers  
-----  
1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
-----  
Sum: 55  
-----
```

- 6) Write a program to convert input string from lower to upper and upper to lower case.

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace LowUp
{
    class Program
    {
        static void Main(string[] args)
        {
            string str1;
            char[] arr1;
            int l,i;
            l=0;
            char ch;
            Console.Write("Input the string : ");
            str1 = Console.ReadLine();
            l=str1.Length;
            arr1 = str1.ToCharArray(0, l);


            Console.Write("\nAfter conversion, the string is : ");
            for (i = 0; i < l; i++)
            {
                ch = arr1[i];
                if (Char.IsLower(ch))
                    Console.Write(Char.ToUpper(ch));
                else
                    Console.Write(Char.ToLower(ch));
            }
            Console.ReadLine();
        }
    }
}
```

OUTPUT

file:///C:/Users/CA172008/Documents/c#/nine/nine/bin/Debug/nine.EXE

Enter the string : MCA

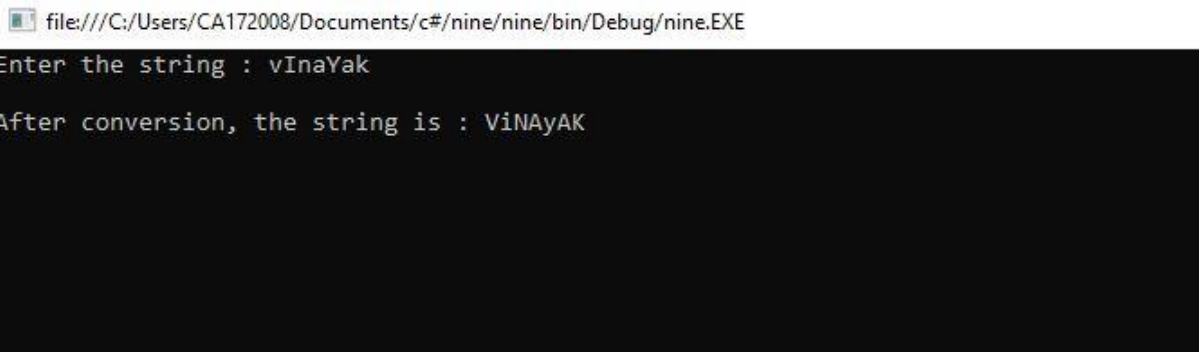
After conversion, the string is : mca



file:///C:/Users/CA172008/Documents/c#/nine/nine/bin/Debug/nine.EXE

Enter the string : hello


After conversion, the string is : HELLO



file:///C:/Users/CA172008/Documents/c#/nine/nine/bin/Debug/nine.EXE


Enter the string : vInaYak

After conversion, the string is : ViNAyAK

 file:///C:/Users/CA172008/Documents/c#/nine/nine/bin/Debug/nine.EXE

Enter the string : ProGram

After conversion, the string is : pROgRAM

 file:///C:/Users/CA172008/Documents/c#/nine/nine/bin/Debug/nine.EXE

Enter the string : C Sharp

After conversion, the string is : c sHARP

7) Demonstrate Command line arguments processing.

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
namespace Sixteen
{
    class Program
    {
        static void Main(string[] args)
        {
            Console.WriteLine("\nNumber of CommadLine Arguments : " + args.Length);
            Console.Write("\nCommandline Arguments Are :\t");
            for (int i = 0; i < args.Length; i++)
            {
                Console.Write(args[i] + "\t");
            }
            Console.ReadLine();
        }
    }
}
```

OUTPUT

Command line arguments:

Working directory: ...

☐ Use remote machine

file:///C:/Users/CA172008/Documents/c#/Sixteen/Sixteen/bin/Debug/Sixteen.EXE

Number of CommadLine Arguments :5

Commandline Arguments Are : 1 2 3 9 4

Command line arguments:

Working directory: ...

☐ Use remote machine

file:///C:/Users/CA172008/Documents/c#/Sixteen/Sixteen/bin/Debug/Sixteen.EXE

Number of CommadLine Arguments :6

Commandline Arguments Are : 1 2 3 4 6 7

Command line arguments:

Working directory: ...

☐ Use remote machine

file:///C:/Users/CA172008/Documents/c#/Sixteen/Sixteen/bin/Debug/Sixteen.EXE

```
Number of CommadLine Arguments :6
Commandline Arguments Are :    12    13    5    6    9    1
```

Command line arguments:

Working directory: ...

☐ Use remote machine

file:///C:/Users/CA172008/Documents/c#/Sixteen/Sixteen/bin/Debug/Sixteen.EXE

```
Number of CommadLine Arguments :4
Commandline Arguments Are :    1    5    6    9
```

Command line arguments:

Working directory: ...

☐ Use remote machine

file:///C:/Users/CA172008/Documents/c#/Sixteen/Sixteen/bin/Debug/Sixteen.EXE

```
Number of CommadLine Arguments :5  
Commandline Arguments Are :    10    4    6    12    78
```

8) Find the second largest element in a single dimensional array.


```
using System;
```

```
using System.Collections.Generic;
```


```
using System.Linq;
```

```
using System.Text;
```


```
namespace pgm14
{
    class Program
    {
        static void Main(string[] args)
        {
            try
            {
                int[] arr = new int[5];
                Console.WriteLine("Enter 5 element in array : ");
                for (int i = 0; i < 5; i++)
                {
                    arr[i] = int.Parse(Console.ReadLine());
                }
                Console.WriteLine("-----");
                Array.Sort(arr);
                Array.Reverse(arr);
                Console.WriteLine("Sorted Array in Reverse Order");
                for (int i = 0; i < 5; i++)
                {
                    Console.WriteLine("A[" + i + "] = " + arr[i]);
                }
                Console.WriteLine("Second Largest Value in Array : " + arr[1]);
            }
            catch (Exception ex) {
                Console.WriteLine("Provide Valid Array Element.\nOnly Numeric Values are allowed.");
            }
            Console.ReadKey();
        }
    }
}
```

OUTPUT file:///C:/Users/CA172008/Documents/c#/Fourteen/Fourteen/bin/Debug/Fourteen.EXE

```
Enter 5 element in array :
100
200
20
60
40
-----
Sorted Array in Reverse Order
A[0] = 200
A[1] = 100
A[2] = 60
A[3] = 40
A[4] = 20
Second Largest Value in Array : 100
```

 file:///C:/Users/CA172008/Documents/c#/Fourteen/Fourteen/bin/Debug/Fourteen.EXE

```
Enter 5 element in array :
50
60
51
020
20
-----
Sorted Array in Reverse Order
A[0] = 60
A[1] = 51
A[2] = 50
A[3] = 20
A[4] = 20
Second Largest Value in Array : 51
```

 file:///C:/Users/CA172008/Documents/c#/Fourteen/Fourteen/bin/Debug/Fourteen.EXE

```
Enter 5 element in array :
1
20
5
5
8
-----
Sorted Array in Reverse Order
A[0] = 20
A[1] = 8
A[2] = 5
A[3] = 5
A[4] = 1
Second Largest Value in Array : 8
```

file:///C:/Users/CA172008/Documents/c#/Fourteen/Fourteen/bin/Debug/Fourteen.EXE

```
Enter 5 element in array :
5
60
51
05
51
-----
Sorted Array in Reverse Order
A[0] = 60
A[1] = 51
A[2] = 51
A[3] = 5
A[4] = 5
Second Largest Value in Array : 51
```

file:///C:/Users/CA172008/Documents/c#/Fourteen/Fourteen/bin/Debug/Fourteen.EXE

```
Enter 5 element in array :
20
30
50
90
100
-----
Sorted Array in Reverse Order
A[0] = 100
A[1] = 90
A[2] = 50
A[3] = 30
A[4] = 20
Second Largest Value in Array : 90
```


9) Program to illustrate the use of different properties in C#.

```
using System;
using System.Collections.Generic;
using System.Text;

namespace Program
{
    class PropertiesDemo
    {
        private string name;
        private int age;

        public string Name
        {
            set
            {
                name = value;
            }
            get
            {
                return name;
            }
        }

        public int Age
        {
            set
            {
                if (value > 0)
                    age = value;
            }

            get
            {
                return age;
            }
        }


        static void Main(string[] args)
        {
            PropertiesDemo p = new PropertiesDemo();
            p.Name = "Vinayak";
            p.Age = 23;

            PropertiesDemo d = new PropertiesDemo();
            d.Name = "Zutti";
            d.Age = 22;
        }
    }
}
```


```
        Console.WriteLine("{0} : {1}", p.Name, p.Age);  
        Console.WriteLine("{0} : {1}", d.Name, d.Age);  
        Console.ReadLine();  
    }  
}  
}
```

OUTPUT file:///C:/Users/CA172008/Documents/c#/Fifteen/Fifteen/bin/Debug/Fifteen.EXE


```
Vinayak : 23  
Zutti : 22
```

 file:///C:/Users/CA172008/Documents/c#/Fifteen/Fifteen/bin/Debug/Fifteen.EXE


```
Akshay : 22  
Shubham : 25
```

 file:///C:/Users/CA172008/Documents/c#/Fifteen/Fifteen/bin/Debug/Fifteen.EXE

```
Sanjeev : 27  
abhi : 21
```

 file:///C:/Users/CA172008/Documents/c#/Fifteen/Fifteen/bin/Debug/Fifteen.EXE

```
Gourav : 27  
Kolaki : 21
```

 file:///C:/Users/CA172008/Documents/c#/Fifteen/Fifteen/bin/Debug/Fifteen.EXE

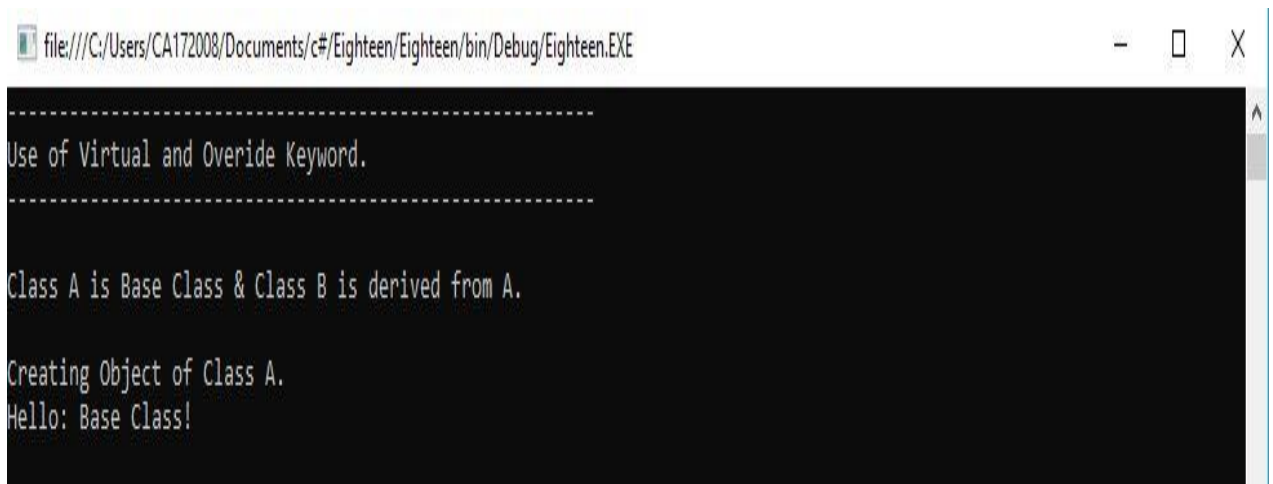
```
ranadive : 27  
suraj : 21
```

10) Demonstrate Use of Virtual and override keyword in C# with a simple Program.

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace ConsoleApplication1
{
    class A
    {
        public virtual void show()
        {
            Console.WriteLine("Hello: Base Class!");
            Console.Write("\nPress Enter...");
            Console.ReadLine();
        }
    }
    class Program
    {
        static void Main(string[] args)
        {
            Console.WriteLine("-----");
            Console.WriteLine("Use of Virtual and Override Keyword.");
            Console.WriteLine("-----");
            Console.WriteLine("\nClass A is Base Class & Class B is derived from A.\n");
            Console.WriteLine("Creating Object of Class A.");
            A a1 = new A();
            a1.show();
            Console.WriteLine("-----\n");
            Console.WriteLine("Creating Object of Class B.");
            B b1 = new B();
            b1.show();
            Console.WriteLine("-----\n");
            Console.WriteLine("Creating Object of Class A and Calling Method of Class B.");
            A a2 = new B();
            a2.show();

            Console.ReadKey();
        }
    }
}
```

OUTPUT

```
file:///C:/Users/CA172008/Documents/c#/Eighteen/Eighteen/bin/Debug/Eighteen.EXE

-----
Use of Virtual and Override Keyword.
-----

Class A is Base Class & Class B is derived from A.

Creating Object of Class A.
Hello: Base Class!
```

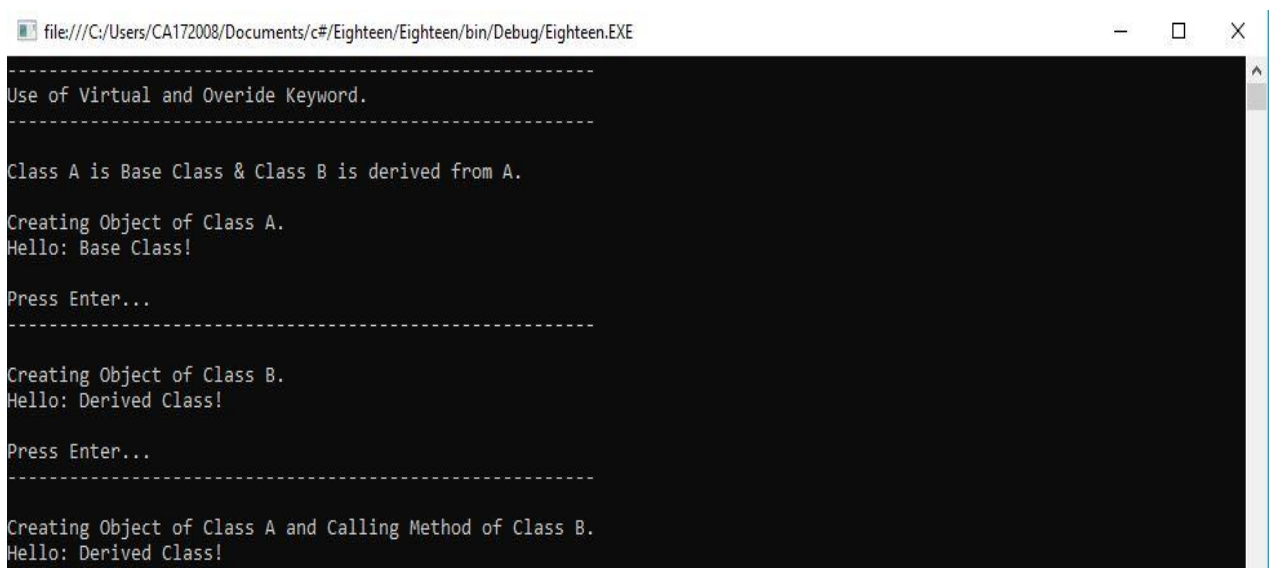


```
file:///C:/Users/CA172008/Documents/c#/Eighteen/Eighteen/bin/Debug/Eighteen.EXE

-----
Use of Virtual and Override Keyword.
-----

Class A is Base Class & Class B is derived from A.

Creating Object of Class B.
Hello: Derived Class!
```



```
file:///C:/Users/CA172008/Documents/c#/Eighteen/Eighteen/bin/Debug/Eighteen.EXE

-----
Use of Virtual and Override Keyword.
-----

Class A is Base Class & Class B is derived from A.

Creating Object of Class A.
Hello: Base Class!

Press Enter...

-----

Creating Object of Class B.
Hello: Derived Class!

Press Enter...

-----

Creating Object of Class A and Calling Method of Class B.
Hello: Derived Class!
```

11) Program to multiply to matrices using Rectangular arrays.

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace ConsoleApplication2
{
    class Program
    {
        static void Main(string[] args)
        {
            Console.WriteLine("-----");
            Console.WriteLine("Matrix Multiplication Using Rectangular Array.");
            Console.WriteLine("-----");

            try
            {
                Console.WriteLine("Enter Rows and Column in 1st Matrix : ");
                int r1 = Convert.ToInt16(Console.ReadLine());
                int c1 = Convert.ToInt16(Console.ReadLine());

                Console.WriteLine("Enter Rows and Column in 2nd Matrix : ");
                int r2 = Convert.ToInt16(Console.ReadLine());
                int c2 = Convert.ToInt16(Console.ReadLine());

                if (r1 != c2)
                {
                    Console.WriteLine("\n*****
                    *****");
                    Console.WriteLine("Matrix Multiplication Row Column Rule
                    Violated.");

                    Console.WriteLine("*****
                    *****");
                }
                else
                {
                    int[,] mat1 = new int[r1, c1];
                    int[,] mat2 = new int[r2, c2];
                    int[,] mat3 = new int[r1, c2];

                    Console.WriteLine("Enter Element in Matrix one : ");
                    for (int i = 0; i < r1; i++)
                    {
                        for (int j = 0; j < c1; j++)
                        {
```

```
        mat1[i, j] = (Convert.ToInt16(Console.ReadLine()));
    }
}
```

```
Console.WriteLine("Enter Element in Matrix two : ");
for (int i = 0; i < r2; i++)
{
    for (int j = 0; j < c2; j++)
    {
        mat2[i, j] = (Convert.ToInt16(Console.ReadLine()));
    }
}
```

```
Console.WriteLine("\nFirst Matrix\n");
for (int i = 0; i < r1; i++)
{
    for (int j = 0; j < c1; j++)
    {
        Console.Write("\t" + mat1[i, j]);
    }
    Console.WriteLine();
}
```

```
Console.WriteLine("\nSecond Matrix\n");
for (int i = 0; i < r2; i++)
{
    for (int j = 0; j < c2; j++)
    {
        Console.Write("\t" + mat2[i, j]);
    }
    Console.WriteLine();
}
```

```
Console.WriteLine("\nMultiplication of Matrix\n");
for (int i = 0; i < r1; i++)
{
    for (int j = 0; j < c2; j++)
    {
        for (int k = 0; k < c1; k++)
        {
            mat3[i, j] += mat1[i, k] * mat2[k, j];
        }
    }
}
```

```
for (int i = 0; i < r2; i++)
```



```
        {
            for (int j = 0; j < c2; j++)
            {
                Console.Write("\t" + mat3[i, j]);
            }
            Console.WriteLine();
        }
    }
}
catch (Exception ex)
{
    Console.WriteLine("\n*****");
    Console.WriteLine("Please Enter Numaric value.");
    Console.WriteLine("\n*****");
}
Console.ReadKey();
}
}
}
```

OUTPUT

```
file:///C:/Users/CA172008/Documents/c#/seventeen/seventeen/bin/Debug/seventeen.EXE
-----
Matrix Multiplication Using Rectangular Array.
-----
Enter Rows and Column in 1st Matrix :
2
2
Enter Rows and Column in 2nd Matrix :
2
2
Enter Element in Matrix one :
1
2
3
4
Enter Element in Matrix two :
5
6
7
8

First Matrix
      1      2
      3      4

Second Matrix
      5      6
      7      8

Multiplication of Matrix
      19      22
      43      50
```

```
file:///C:/Users/CA172008/Documents/c#/seventeen/seventeen/bin/Debug/seventeen.EXE
-----
Matrix Multiplication Using Rectangular Array.
-----
Enter Rows and Column in 1st Matrix :
3
3
Enter Rows and Column in 2nd Matrix :
3
3
Enter Element in Matrix one :
1
2
3
5
6
4
7
8
9
Enter Element in Matrix two :
5
6
2
1
4
8
9
2
1

First Matrix
      1      2      3
      5      6      4
      7      8      9

Second Matrix
      5      6      2
      1      4      8
      9      2      1
```

```
file:///C:/Users/CA172008/Documents/c#/seventeen/seventeen/bin/Debug/seventeen.EXE
-----
Matrix Multiplication Using Rectangular Array.
-----
Enter Rows and Column in 1st Matrix :
2
2
Enter Rows and Column in 2nd Matrix :
2
2
Enter Element in Matrix one :
5
6
4
8
Enter Element in Matrix two :
9
5
2
2

First Matrix
      5      6
      4      8

Second Matrix
      9      5
      2      2

Multiplication of Matrix
      57      37
      52      36
```

```
file:///C:/Users/CA172008/Documents/c#/seventeen/seventeen/bin/Debug/seventeen.EXE
-----
Matrix Multiplication Using Rectangular Array.
-----
Enter Rows and Column in 1st Matrix :
2
2
Enter Rows and Column in 2nd Matrix :
2
2
Enter Element in Matrix one :
6
5
4
9
Enter Element in Matrix two :
7
8
4
2

First Matrix
      6      5
      4      9

Second Matrix
      7      8
      4      2

Multiplication of Matrix
      62      58
      64      50
```

```
file:///C:/Users/CA172008/Documents/c#/seventeen/seventeen/bin/Debug/seventeen.EXE
-----
Matrix Multiplication Using Rectangular Array.
-----
Enter Rows and Column in 1st Matrix :
2
2
Enter Rows and Column in 2nd Matrix :
2
2
Enter Element in Matrix one :
12
23
21
45
Enter Element in Matrix two :
65
12
35
98

First Matrix
      12      23
      21      45

Second Matrix
      65      12
      35      98

Multiplication of Matrix
      1585    2398
      2940    4662
```

12) Perform operator overloading.

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace OperatorOverloading
{
    class Rectangle
    {
        int width;
        int height;

        Rectangle(int width, int height)
        {
            this.width = width;
            this.height = height;
        }

        public static Rectangle operator +(Rectangle a, Rectangle b)
        {
            int totalWidth = a.width + b.width;
            int totalHeight = a.height + b.height;
            return new Rectangle(totalWidth, totalHeight);
        }

        static void Main(string[] args)
        {
            Rectangle r1 = new Rectangle(40, 60);
            Rectangle r2 = new Rectangle(60, 40);
            Console.WriteLine("-----");
            Console.WriteLine("First Rectangle");
            Console.WriteLine("-----");
            Console.WriteLine("");
            Console.WriteLine("Rectangle Width: {0}", r1.width);
            Console.WriteLine("Rectangle Height: {0}", r1.height);

            Console.WriteLine();

            Console.WriteLine("-----");
            Console.WriteLine("Second Rectangle");
            Console.WriteLine("-----");
            Console.WriteLine("");
            Console.WriteLine("Rectangle Width: {0}", r2.width);
            Console.WriteLine("Rectangle Height: {0}", r2.height);

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

```
Rectangle r3 = r1 + r2;  
Console.WriteLine("Total Width: {0}", r3.width);  
Console.WriteLine("Total Height: {0}", r3.height);  
Console.ReadKey();  
    }  
}  
}
```

OUTPUT

The screenshot shows a Windows application window titled "file:///C:/Users/CA172008/Documents/c#/twelve/twelve/bin/Debug/twelve.EXE". The application output is as follows:

```
-----  
First Rectangle  
-----  
  
Rectangle Width: 40  
Rectangle Height: 60  
  
-----  
Second Rectangle  
-----  
  
Rectangle Width: 60  
Rectangle Height: 40  
  
Total Width: 100  
Total Height: 100
```

- 13) Create classes, they are reference types in C# and hence are allocated on the heap. Classes provide object-oriented constructs such as encapsulation, polymorphism, and inheritance. For instance, the program should print John. Doe twice, illustrating that objects are reference types, allocated on the heap implement the same using C#

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace ProgramTwo
{
    class Program
    {
        class User
        {
            private string name;
            private string email;

            public User(String name)
            {
                this.name = name;
            }

            public User(String name, String email)
            {
                this.name = name;
                this.email = email;
            }

            public string getName()
            {
                return name;
            }

            public string getEmail()
            {
                return email;
            }

            public void setName(string name)
            {
                this.name = name;
            }

            public void setEmail(string email)
            {
                this.email = email;
            }
        }
    }
}
```



```
    }  
}  
  
class Admin : User  
{  
    private string password;  
    public Admin(string name, string email, string password)  
        : base(name, email)  
    {  
        this.password = password;  
    }  
  
    public void setPassword(string password)  
    {  
        this.password = password;  
    }  
  
    public string getPassword()  
    {  
        return password;  
    }  
  
    static void Main(string[] args)  
    {  
        User user1 = new User("vinoo");  
        Admin user2 = new Admin("vinayak", "vinoo160496@gmail.com",  
            "vinu007");  
  
        Console.WriteLine("User 1:");  
        Console.WriteLine("Name: {0}", user1.getName());  
        Console.WriteLine("Email: {0}", user1.getEmail());  
  
        Console.WriteLine();  
  
        Console.WriteLine("User 2 (Admin):");  
        Console.WriteLine("Name: {0}", user2.getName());  
        Console.WriteLine("Email: {0}", user2.getEmail());  
        Console.WriteLine("Password: {0}", user2.getPassword());  
  
        Console.Read();  
    }  
}
```

OUTPUT

```
Select file:///C:/Users/CA172008/Documents/c#/second/second/bin/Debug/second.EXE
User 1:
Name: vino0
Email:
User 2 (Admin):
Name: vinayak
Email: vino0160496@gmail.com
Password: vinu007
```