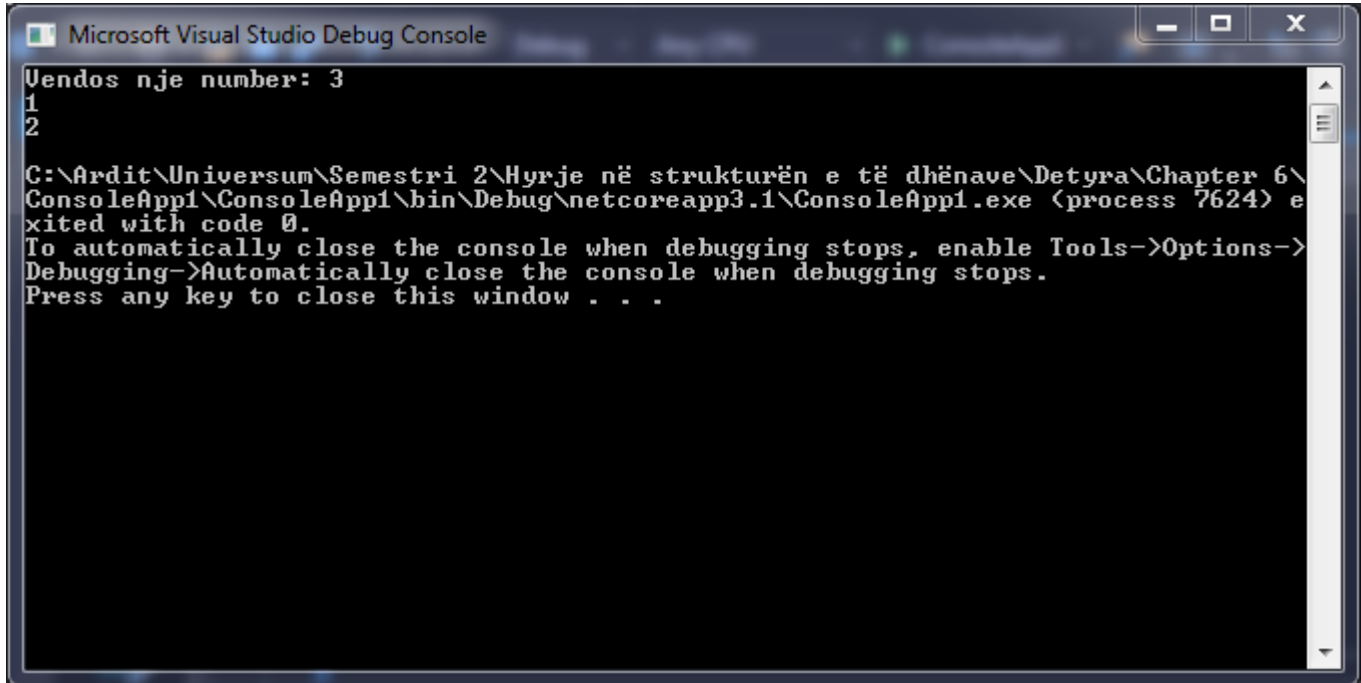


1. Write a program that prints on the console **the numbers from 1 to N**. The number **N** should be read from the standard input.

```
using System;

namespace ConsoleApp1
{
    class Program
    {
        static void Main(string[] args)
        {
            Console.Write("Vendos nje number: ");
            int length = Int32.Parse(Console.ReadLine());

            for (int i = 1; i < length; i++)
                Console.WriteLine(i);
        }
    }
}
```



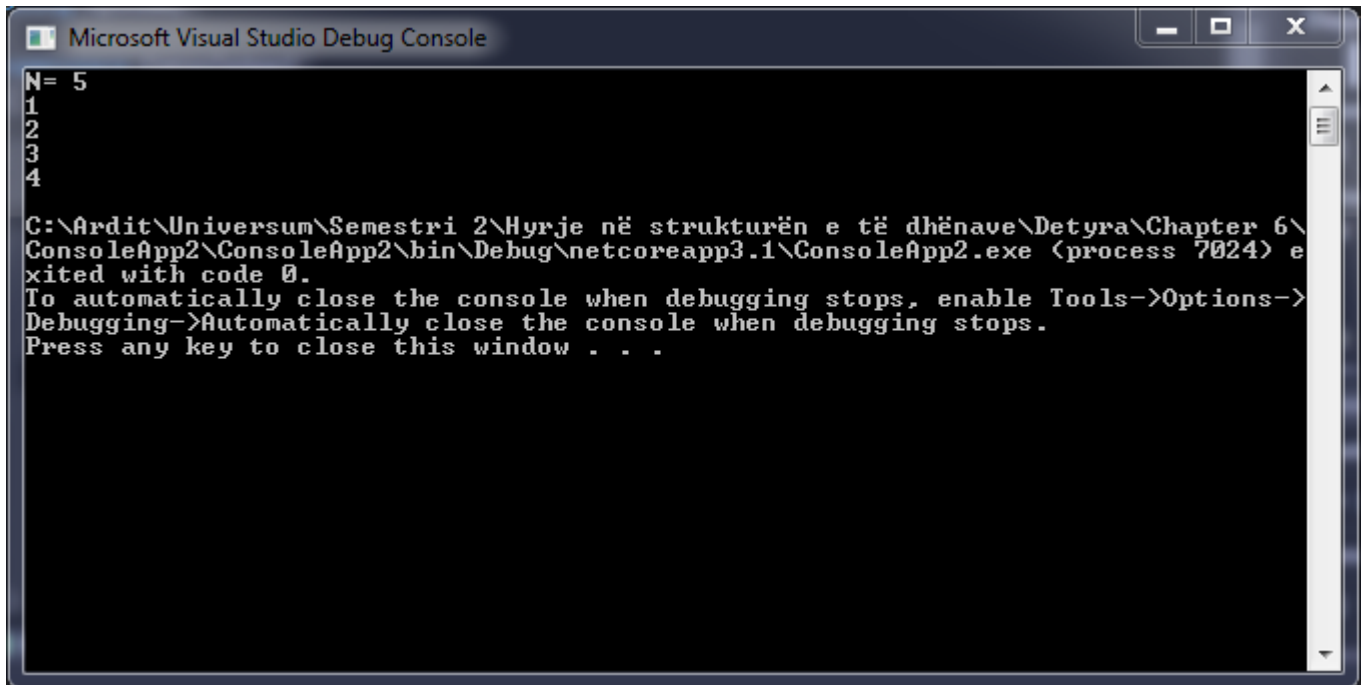
```
Microsoft Visual Studio Debug Console
Vendos nje number: 3
1
2
C:\Ardit\Universum\Semestri 2\Hyrje në strukturën e të dhënave\Detyra\Chapter 6\ConsoleApp1\ConsoleApp1\bin\Debug\netcoreapp3.1\ConsoleApp1.exe (process 7624) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the console when debugging stops.
Press any key to close this window . . .
```

2. Write a program that prints on the console the numbers from 1 to N, which are **not divisible by 3 and 7 simultaneously**. The number N should be read from the standard input.

```
using System;

namespace ConsoleApp2
{
    class Program
    {
        static void Main(string[] args)
        {
            Console.Write("N= ");
            int length = Int32.Parse(Console.ReadLine());

            for (int i = 1; i < length; i++)
            {
                if (i % (3 * 7) != 0) Console.WriteLine(i);
            }
        }
    }
}
```



The screenshot shows the Microsoft Visual Studio Debug Console window. The title bar reads "Microsoft Visual Studio Debug Console". The console output is as follows:

```
N= 5
1
2
3
4

C:\Ardit\Universum\Semestri 2\Hyrje në strukturën e të dhënave\Detyra\Chapter 6\
ConsoleApp2\ConsoleApp2\bin\Debug\netcoreapp3.1\ConsoleApp2.exe (process 7024) e
xited 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 . . .
```

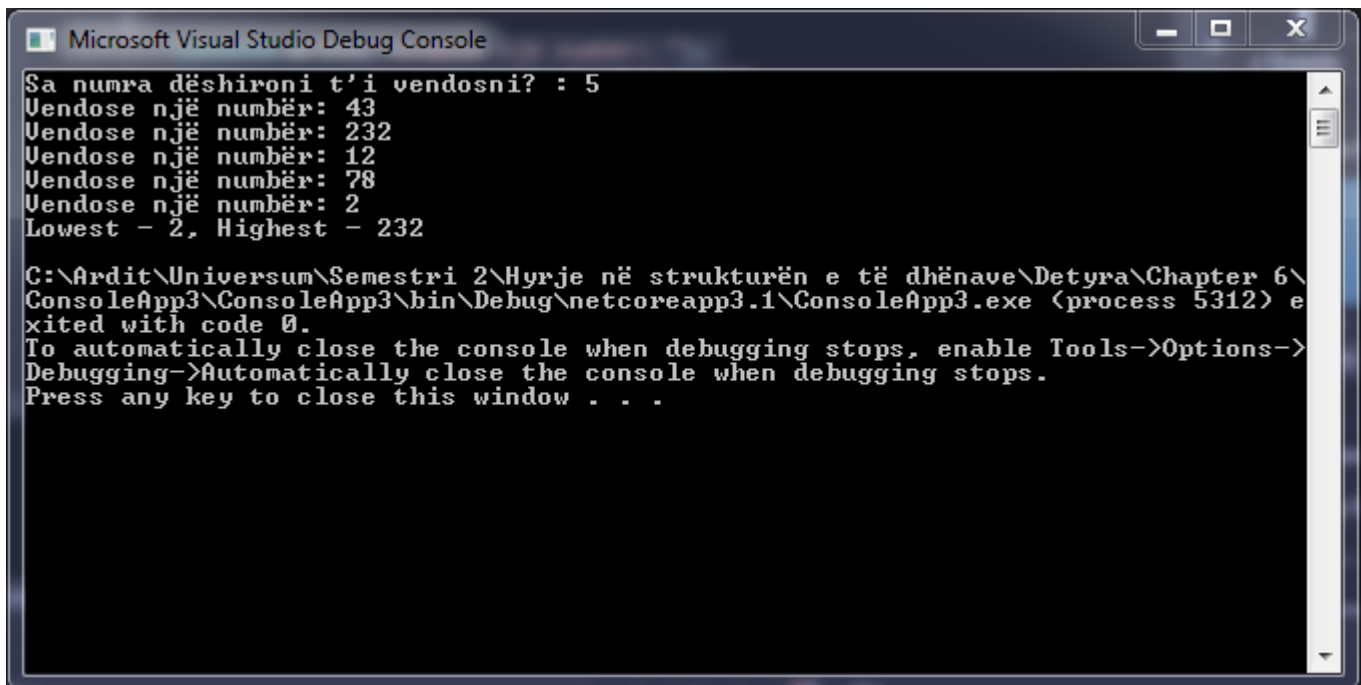
3. Write a program that reads from the console a series of integers and prints the **smallest** and **largest** of them.

```
using System;

namespace ConsoleApp3
{
    class Program
    {
        static void Main(string[] args)
        {
            int lowest = 0, highest = 0, input;

            Console.Write("Sa numra dëshironi t'i vendosni? : ");
            int lenght = Int32.Parse(Console.ReadLine());

            for (int i = 0; i < lenght; i++)
            {
                Console.Write("Vendose një numër: ");
                input = Int32.Parse(Console.ReadLine());
                if (i == 0) lowest = highest = input;
                else
                {
                    if (lowest > input) lowest = input;
                    if (highest < input) highest = input;
                }
            }
            Console.WriteLine("Lowest - {0}, Highest - {1}", lowest, highest);
        }
    }
}
```



```
Microsoft Visual Studio Debug Console

Sa numra dëshironi t'i vendosni? : 5
Vendose një numër: 43
Vendose një numër: 232
Vendose një numër: 12
Vendose një numër: 78
Vendose një numër: 2
Lowest - 2, Highest - 232

C:\Ardit\Universum\Semestri 2\Hyrje në strukturën e të dhënave\Detyra\Chapter 6\
ConsoleApp3\ConsoleApp3\bin\Debug\netcoreapp3.1\ConsoleApp3.exe (process 5312) e
xited 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 . . .
```

4. Write a program that prints **all possible cards from a standard deck** of cards, without jokers (there are 52 cards: 4 suits of 13 cards).

```
static void Main(string[] args)
{
    for (int i = 0; i < 4; i++)
    {
        if (i != 0) Console.WriteLine();

        for (int j = 0; j < 13; j++)
        {
            switch (i)
            {
                case 0: Console.Write("Hearts "); break;
                case 1: Console.Write("Diamonds "); break;
                case 2: Console.Write("Spades "); break;
                case 3: Console.Write("Clubs "); break;
            }
            switch (j)
            {
                case 0: Console.WriteLine("2"); break;
                case 1: Console.WriteLine("3"); break;
                case 2: Console.WriteLine("4"); break;
                case 3: Console.WriteLine("5"); break;
                case 4: Console.WriteLine("6"); break;
                case 5: Console.WriteLine("7"); break;
                case 6: Console.WriteLine("8"); break;
                case 7: Console.WriteLine("9"); break;
                case 8: Console.WriteLine("10"); break;
                case 9: Console.WriteLine("J"); break;
                case 10: Console.WriteLine("Q"); break;
                case 11: Console.WriteLine("K"); break;
                case 12: Console.WriteLine("A"); break;
            }
        }
    }
    Console.ReadLine();
}
```

```
C:\Ardit\Universum\Semestri 2\Hyrje në strukturën e të dhënave\Detyra\Chapter 6\ConsoleApp4\...
Hearts 10
Hearts J
Hearts Q
Hearts K
Hearts A

Diamonds 2
Diamonds 3
Diamonds 4
Diamonds 5
Diamonds 6
Diamonds 7
Diamonds 8
Diamonds 9
Diamonds 10
Diamonds J
Diamonds Q
Diamonds K
Diamonds A

Spades 2
Spades 3
Spades 4
Spades 5
Spades 6
Spades 7
Spades 8
Spades 9
Spades 10
Spades J
Spades Q
Spades K
Spades A

Clubs 2
Clubs 3
Clubs 4
Clubs 5
Clubs 6
Clubs 7
Clubs 8
Clubs 9
Clubs 10
Clubs J
Clubs Q
Clubs K
Clubs A
```

5. Write a program that reads from the console number N and print the sum of the first N members of the **Fibonacci sequence**: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, ...

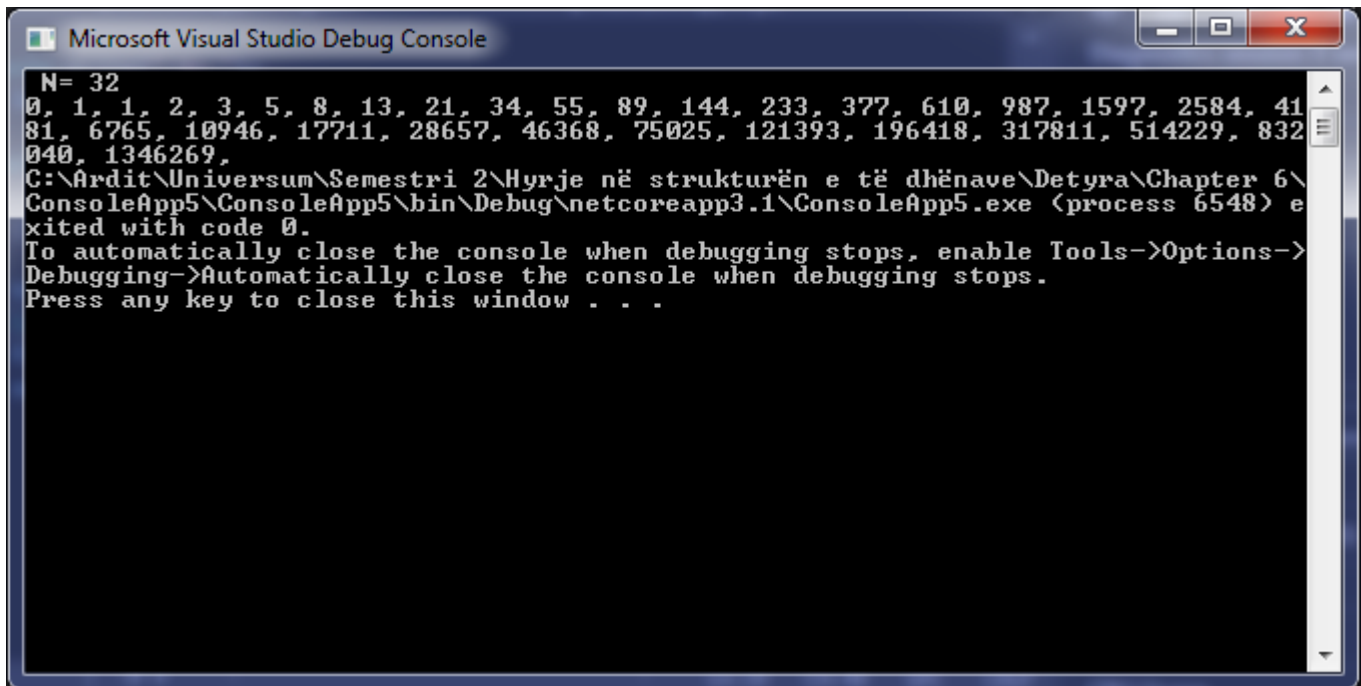
```
using System;

namespace ConsoleApp5
{
    class Program
    {
        static void Main(string[] args)
        {
            int firstN = 0, secondN = 1, thirdN = 0;

            Console.Write(" N= ");
            int length = Int32.Parse(Console.ReadLine());

            Console.Write("0, 1,");

            for (int i = 2; i < length; i++)
            {
                thirdN = firstN + secondN;
                Console.Write(" {0},", thirdN);
                firstN = secondN;
                secondN = thirdN;
            }
        }
    }
}
```



The screenshot shows the Microsoft Visual Studio Debug Console window. The title bar reads "Microsoft Visual Studio Debug Console". The console output displays the Fibonacci sequence for N=32. The first line is "N= 32". The second line shows the sequence: "0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987, 1597, 2584, 4181, 6765, 10946, 17711, 28657, 46368, 75025, 121393, 196418, 317811, 514229, 832040, 1346269,". The third line shows the file path: "C:\Ardit\Universum\Semestri 2\Hyrje në strukturën e të dhënave\Detyra\Chapter 6\ConsoleApp5\ConsoleApp5\bin\Debug\netcoreapp3.1\ConsoleApp5.exe (process 6548) e". The fourth line says "xited with code 0.". The fifth line says "To automatically close the console when debugging stops, enable Tools->Options->". The sixth line says "Debugging->Automatically close the console when debugging stops.". The seventh line says "Press any key to close this window . . .".

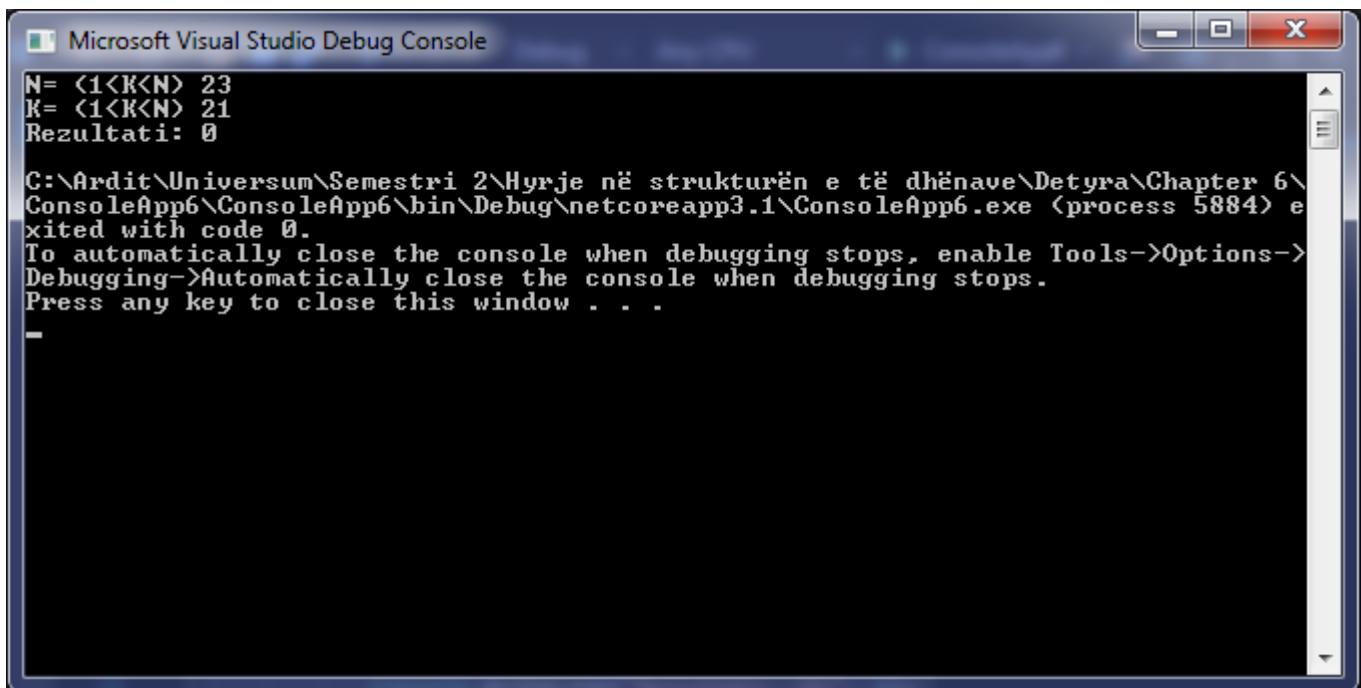
6. Write a program that calculates $N!/K!$ for given N and K ($1 < K < N$).
using System;

```
namespace ConsoleApp6
{
    class Program
    {
        static void Main(string[] args)
        {
            Console.Write("N= (1<K<N) ");
            int n = Int32.Parse(Console.ReadLine());
            Console.Write("K= (1<K<N) ");
            int k = Int32.Parse(Console.ReadLine());

            for (int i = n - 1; i > 0; i--)
            {
                n *= i;
            }

            for (int i = k - 1; i > 0; i--)
            {
                k *= i;
            }

            n /= k;
            Console.WriteLine("Rezultati: {0}", n);
        }
    }
}
```



```
Microsoft Visual Studio Debug Console
N= (1<K<N) 23
K= (1<K<N) 21
Rezultati: 0

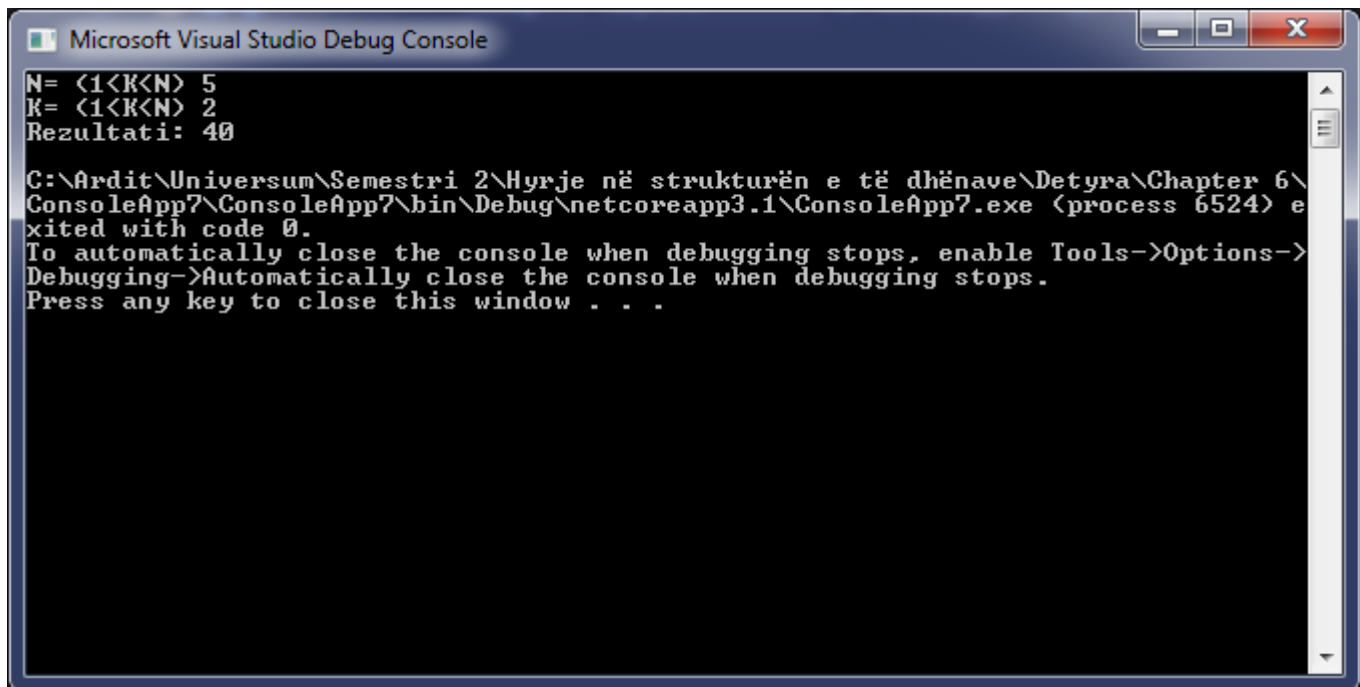
C:\Ardit\Universum\Semestri 2\Hyrje në strukturën e të dhënave\Detyra\Chapter 6\ConsoleApp6\ConsoleApp6\bin\Debug\netcoreapp3.1\ConsoleApp6.exe (process 5884) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the console when debugging stops.
Press any key to close this window . . .
```

7. Write a program that calculates $N! \cdot K! / (N-K)!$ for given N and K ($1 < K < N$).
using System;

```
namespace ConsoleApp7
{
    class Program
    {
        static void Main(string[] args)
        {
            Console.Write("N= (1<K<N) ");
            int n = Int32.Parse(Console.ReadLine());
            Console.Write("K= (1<K<N) ");
            int k = Int32.Parse(Console.ReadLine());
            int nMinusK = n - k;

            for (int i = n - 1; i > 0; i--) n *= i;
            for (int i = k - 1; i > 0; i--) k *= i;
            for (int i = nMinusK - 1; i > 0; i--) nMinusK *= i;

            Console.WriteLine("Rezultati: {0}", n * k / nMinusK);
        }
    }
}
```



The screenshot shows the Microsoft Visual Studio Debug Console window. The output of the program is as follows:

```
N= (1<K<N) 5
K= (1<K<N) 2
Rezultati: 40
```

Below the output, the console displays the file path and process information:

```
C:\Ardit\Universum\Semestri 2\Hyrje në strukturën e të dhënave\Detyra\Chapter 6\
ConsoleApp7\ConsoleApp7\bin\Debug\netcoreapp3.1\ConsoleApp7.exe (process 6524) e
xited with code 0.
```

Finally, it provides instructions for closing the console window:

```
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 . . .
```


8. In combinatorics, the Catalan numbers are calculated by the following formula:

$$C_n = \frac{1}{n+1} \binom{2n}{n} = \frac{(2n)!}{(n+1)!n!}, \text{ for } n \geq 0.$$

Write a program that calculates the n-th Catalan number by given n.

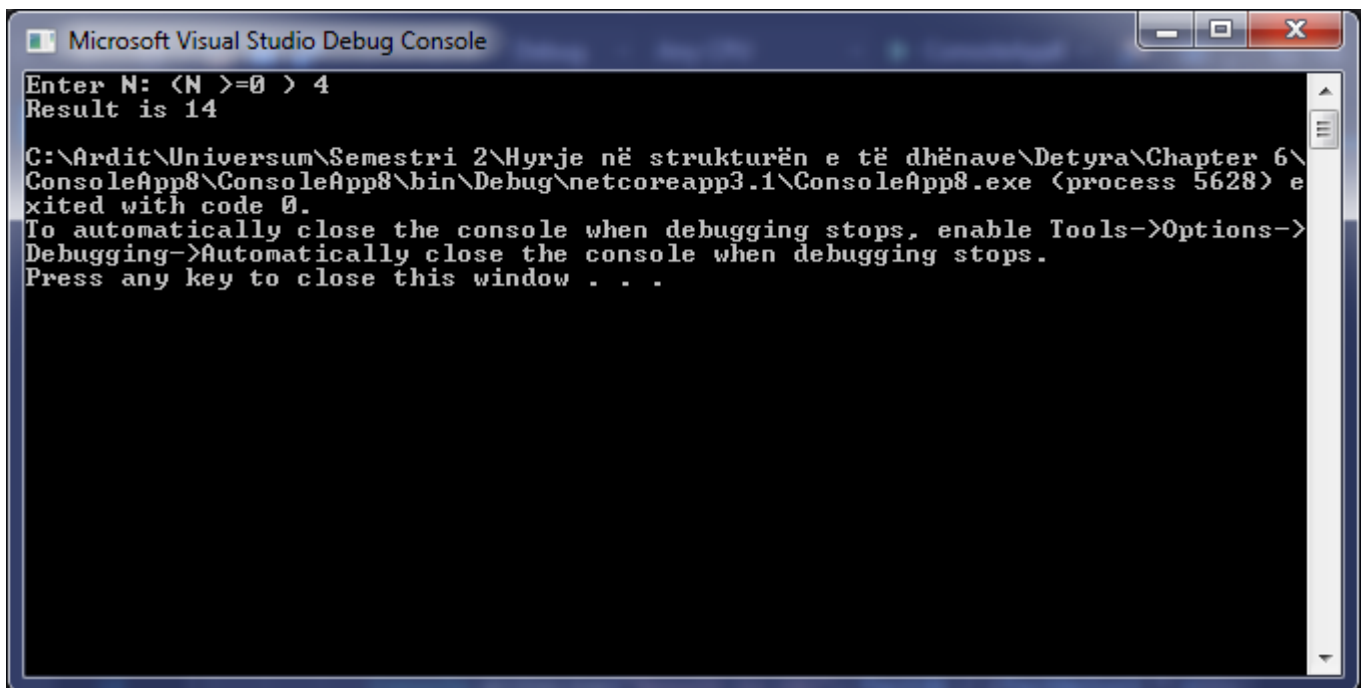
```
using System;

namespace ConsoleApp8
{
    class Program
    {
        static void Main(string[] args)
        {
            Console.WriteLine("Enter N: (N >=0 ) ");
            int n = Int32.Parse(Console.ReadLine());

            int fact2N = 2 * n, factNplus1 = n + 1;

            for (int i = fact2N - 1; i > 0; i--) fact2N *= i;
            for (int i = factNplus1 - 1; i > 0; i--) factNplus1 *= i;
            for (int i = n - 1; i > 0; i--) n *= i;

            Console.WriteLine("Result is {0}", fact2N / (factNplus1 * n));
        }
    }
}
```

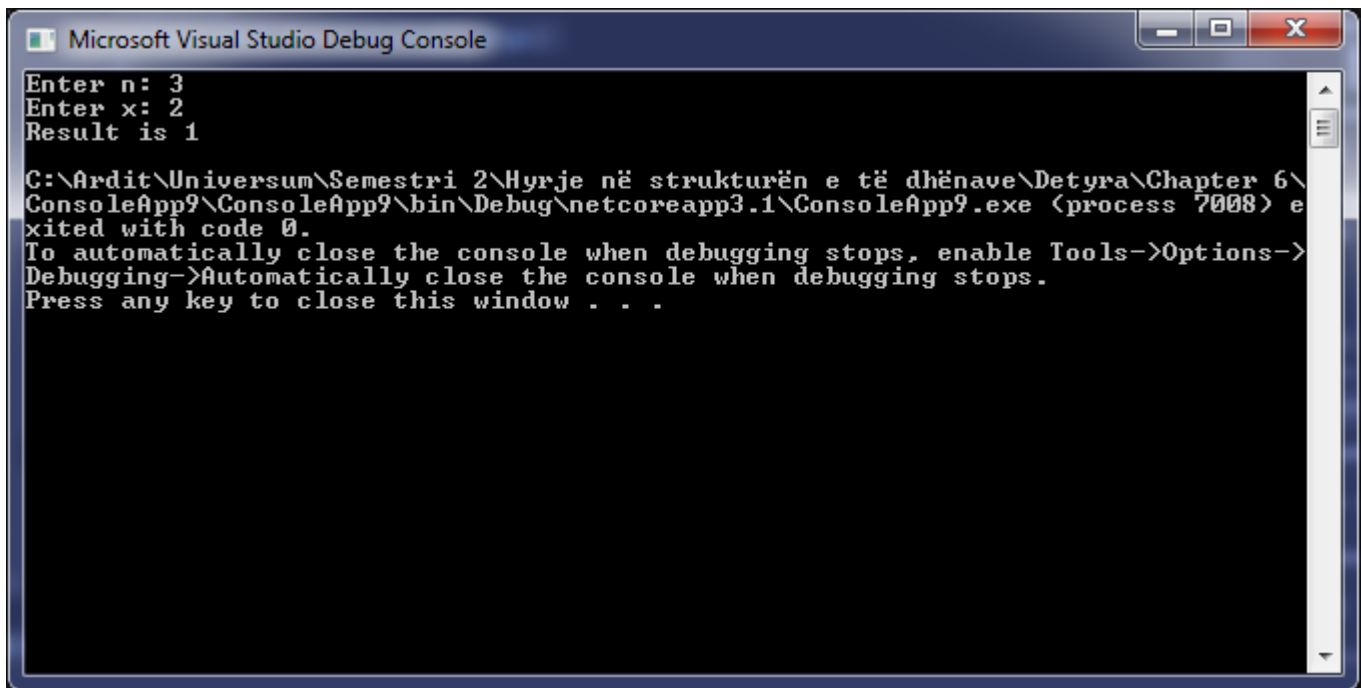


9. Write a program that for a given integers **n** and **x**, calculates the sum: $S = 1 + \frac{1!}{x} + \frac{2!}{x^2} + \dots + \frac{n!}{x^n}$

using System;

namespace ConsoleApp9

```
{  
    class Program  
    {  
        static void Main(string[] args)  
        {  
            int sum = 1, temp = 1;  
            Console.Write("Enter n: ");  
            int n = Int32.Parse(Console.ReadLine());  
            Console.Write("Enter x: ");  
            int x = Int32.Parse(Console.ReadLine());  
  
            for (int i = 1; i <= n; i++)  
            {  
                temp *= i / x;  
                sum += temp;  
            }  
  
            Console.WriteLine("Result is {0}", sum);  
        }  
    }  
}
```

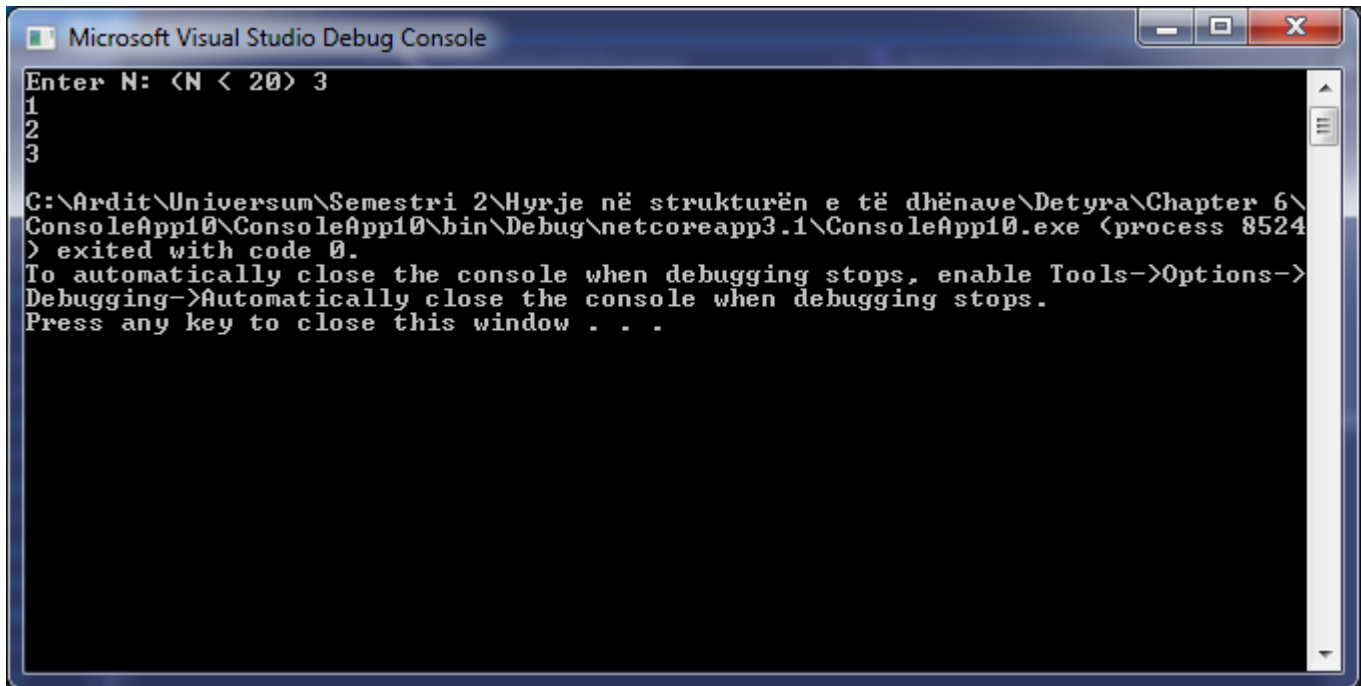


10. Write a program that reads from the console a **positive integer number N** ($N < 20$) and prints a **matrix** of numbers as on the figures below:

```
using System;

namespace ConsoleApp10
{
    class Program
    {
        static void Main(string[] args)
        {
            Console.Write("Enter N: (N < 20) ");
            int n = Int32.Parse(Console.ReadLine());

            for (int i = 1; i <= n; i++)
            {
                for (int j = i; j <= i; j++)
                {
                    Console.Write("{0} ", j);
                }
                Console.WriteLine();
            }
        }
    }
}
```



11. Write a program that calculates with **how many zeroes the factorial of a given number ends**. Examples:
N = 10 -> N! = 36288**00** -> 2
N = 20 -> N! = 243290200817664**0000** -> 4

```
using System;

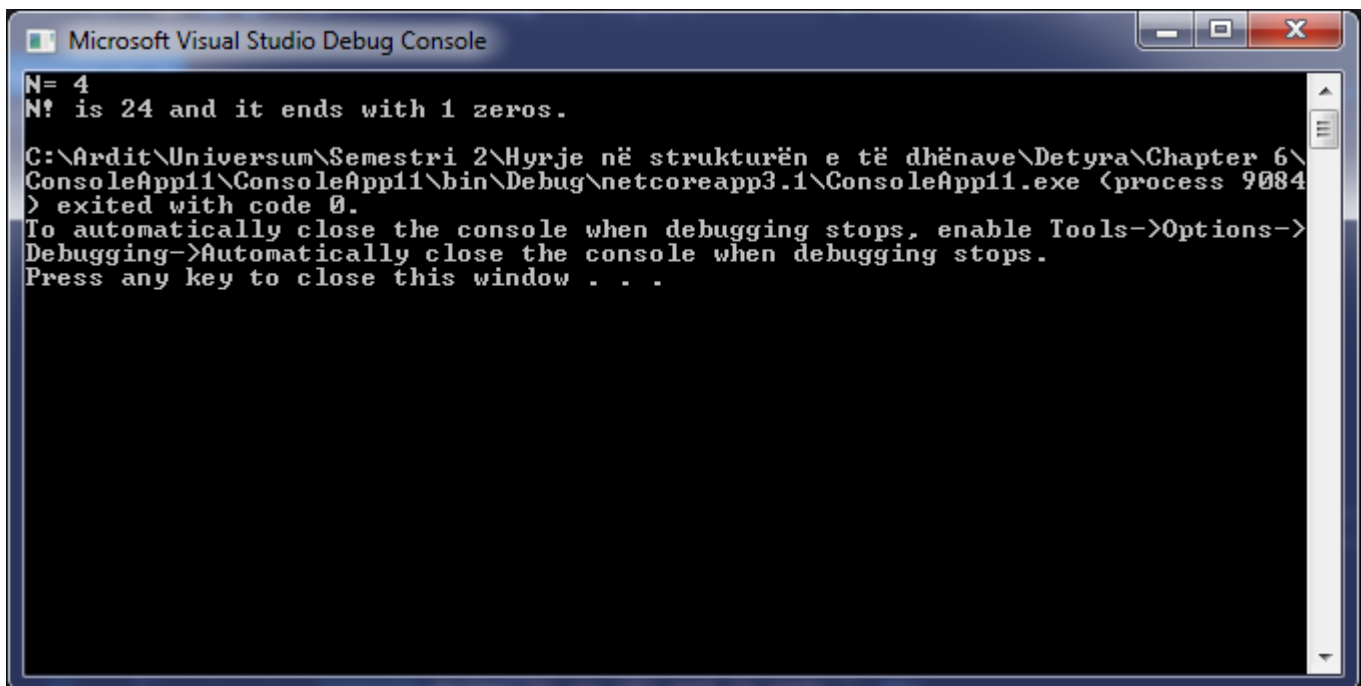
namespace ConsoleApp11
{
    class Program
    {
        static void Main(string[] args)
        {
            Console.Write("N= ");
            decimal n = Int32.Parse(Console.ReadLine());
            int zeroes = 0;

            for (int i = (int)(n - 1); i > 0; i--)
                n *= i;

            Console.WriteLine("N! is {0} and it ends ", n);

            do
            {
                n /= 10;
                zeroes++;
            } while (n % 10 == 0);

            Console.WriteLine("with {0} zeros.", zeroes);
        }
    }
}
```



```
Microsoft Visual Studio Debug Console

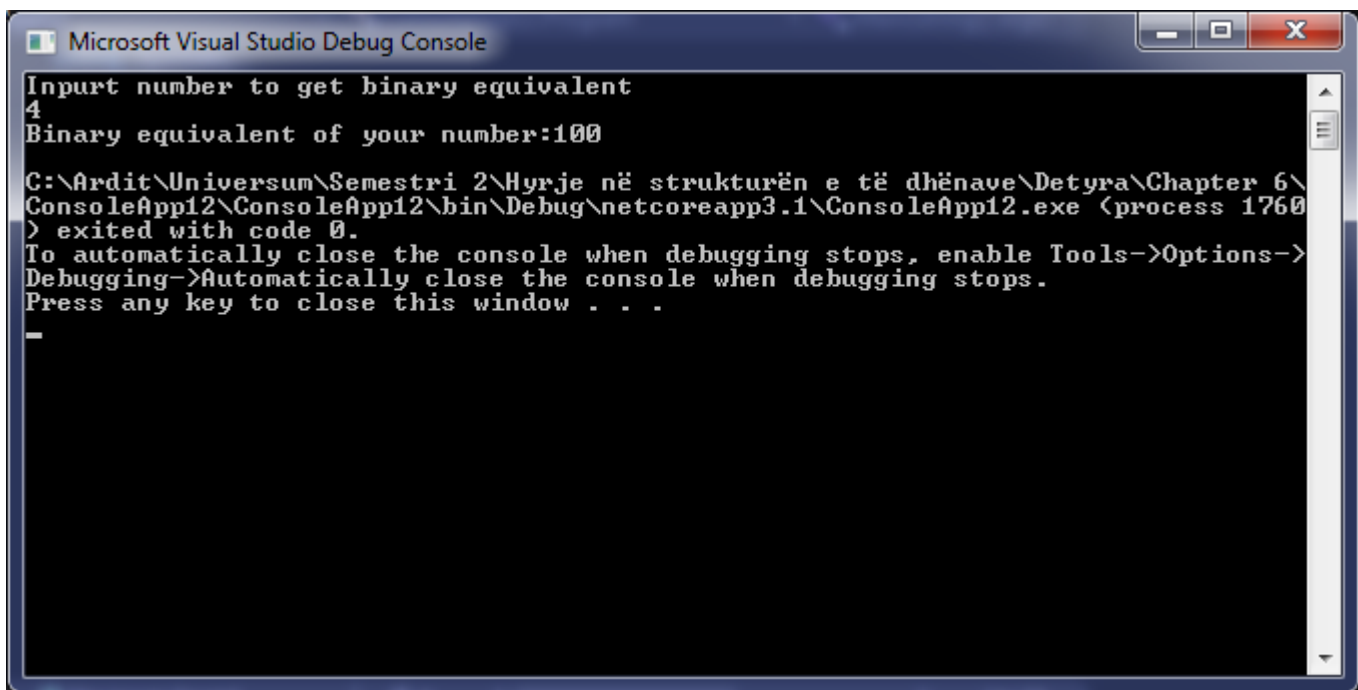
N= 4
N! is 24 and it ends with 1 zeros.

C:\Ardit\Universum\Semestri 2\Hyrje në strukturën e të dhënave\Detyra\Chapter 6\
ConsoleApp11\ConsoleApp11\bin\Debug\netcoreapp3.1\ConsoleApp11.exe (process 9084
) 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 . . .
```

12. Write a program that converts a given number **from decimal to binary notation** (numeral system).

```
using System;

namespace ConsoleApp12
{
    class Program
    {
        static void Main(string[] args)
        {
            Console.WriteLine("Input number to get binary equivalent");
            Console.WriteLine("Binary equivalent of your number:" +
Convert.ToString(Convert.ToInt32(Console.ReadLine()), 2));
        }
    }
}
```



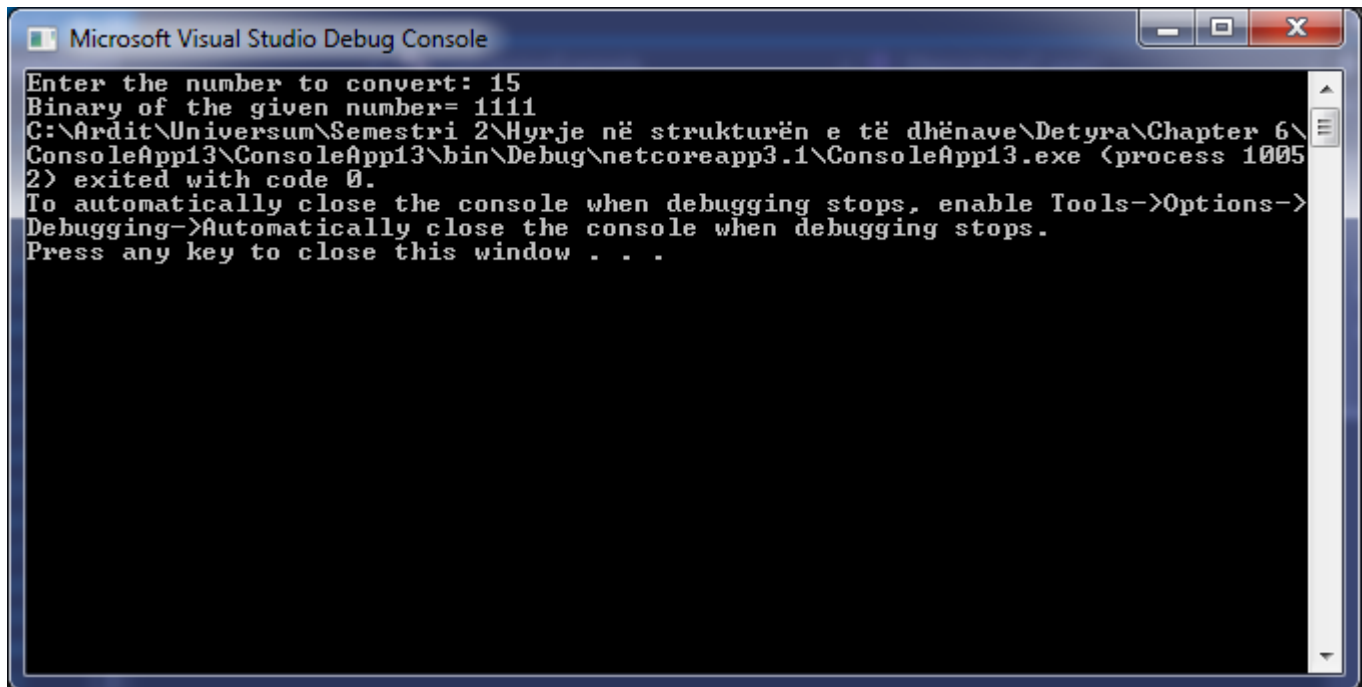
```
Microsoft Visual Studio Debug Console

Input number to get binary equivalent
4
Binary equivalent of your number:100

C:\Ardit\Universum\Semestri 2\Hyrje në strukturën e të dhënave\Detyra\Chapter 6\
ConsoleApp12\ConsoleApp12\bin\Debug\netcoreapp3.1\ConsoleApp12.exe (process 1760
) 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 . . .
```

13. Write a program that converts a given number **from binary to decimal notation**.

```
using System;
public class ConversionExample
{
    public static void Main(string[] args)
    {
        int n, i;
        int[] a = new int[10];
        Console.Write("Enter the number to convert: ");
        n = int.Parse(Console.ReadLine());
        for (i = 0; n > 0; i++)
        {
            a[i] = n % 2;
            n = n / 2;
        }
        Console.Write("Binary of the given number= ");
        for (i = i - 1; i >= 0; i--)
        {
            Console.Write(a[i]);
        }
    }
}
```



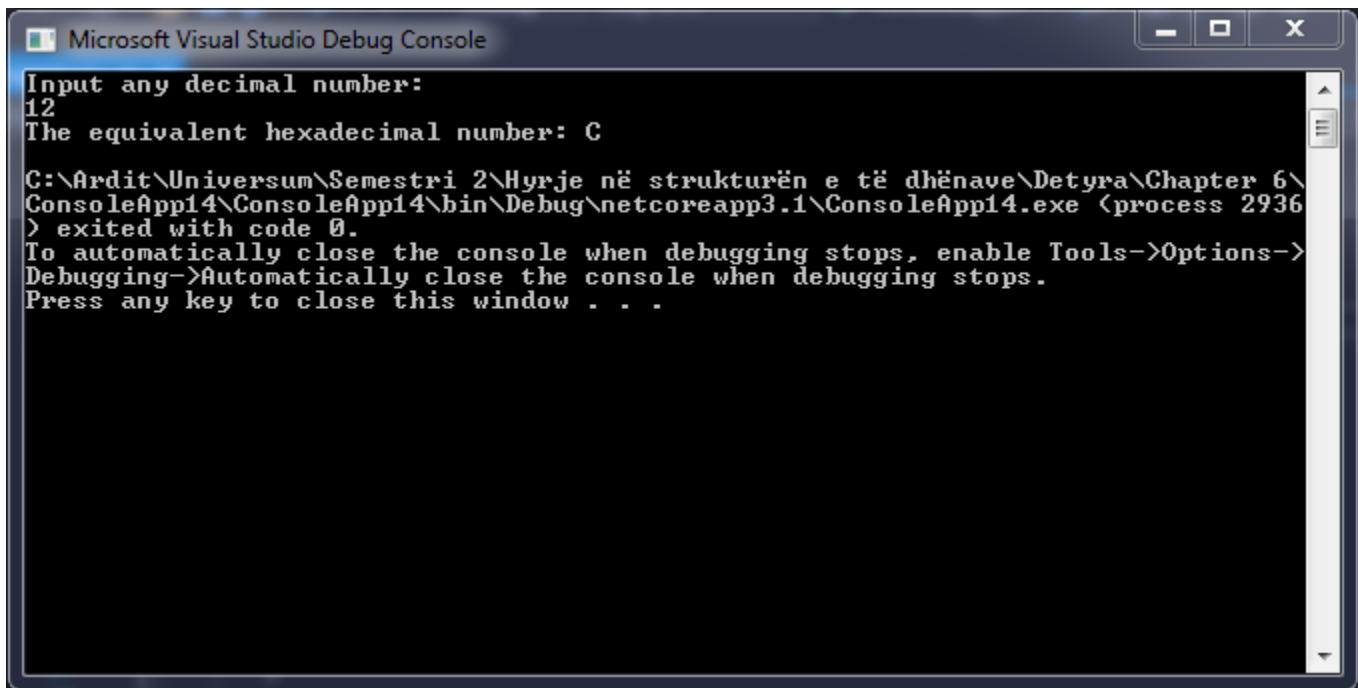
```
Microsoft Visual Studio Debug Console
Enter the number to convert: 15
Binary of the given number= 1111
C:\Ardit\Universum\Semestri 2\Hyrje në strukturën e të dhënave\Detyra\Chapter 6\
ConsoleApp13\ConsoleApp13\bin\Debug\netcoreapp3.1\ConsoleApp13.exe (process 1005
2) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->
Debugging->Automatically close the console when debugging stops.
Press any key to close this window . . .
```

14. Write a program that converts a given number **from decimal to hexadecimal notation**.

```
using System;

namespace ConsoleApp14
{
    using System;
    class program
    {
        public static void Main()
        {
            int x;
            string hexvalue;
            Console.WriteLine("Input any decimal number: ");
            x = Convert.ToInt32(Console.ReadLine());
            hexvalue = x.ToString("X");

            Console.WriteLine("The equivalent hexadecimal number: {0}", hexvalue);
        }
    }
}
```



```
Microsoft Visual Studio Debug Console
Input any decimal number:
12
The equivalent hexadecimal number: C

C:\Ardit\Universum\Semestri 2\Hyrje në strukturën e të dhënave\Detyra\Chapter 6\
ConsoleApp14\ConsoleApp14\bin\Debug\netcoreapp3.1\ConsoleApp14.exe (process 2936
) 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 . . .
```

15. Write a program that converts a given number **from hexadecimal to decimal notation**.

```
using System;

namespace ConsoleApp15
{
    class Program
    {
        static void Main(string[] args)
        {
            string hexval = "4B0";
            Console.WriteLine("Hexadecimal number: " + hexval);
            int decValue = int.Parse(hexval, System.Globalization.NumberStyles.HexNumber);
            Console.WriteLine("Convert to-");
            Console.WriteLine("Decimal number: " + decValue);
        }
    }
}
```


16. Write a program that by a given integer **N** prints the numbers from 1 to N in **random order**.

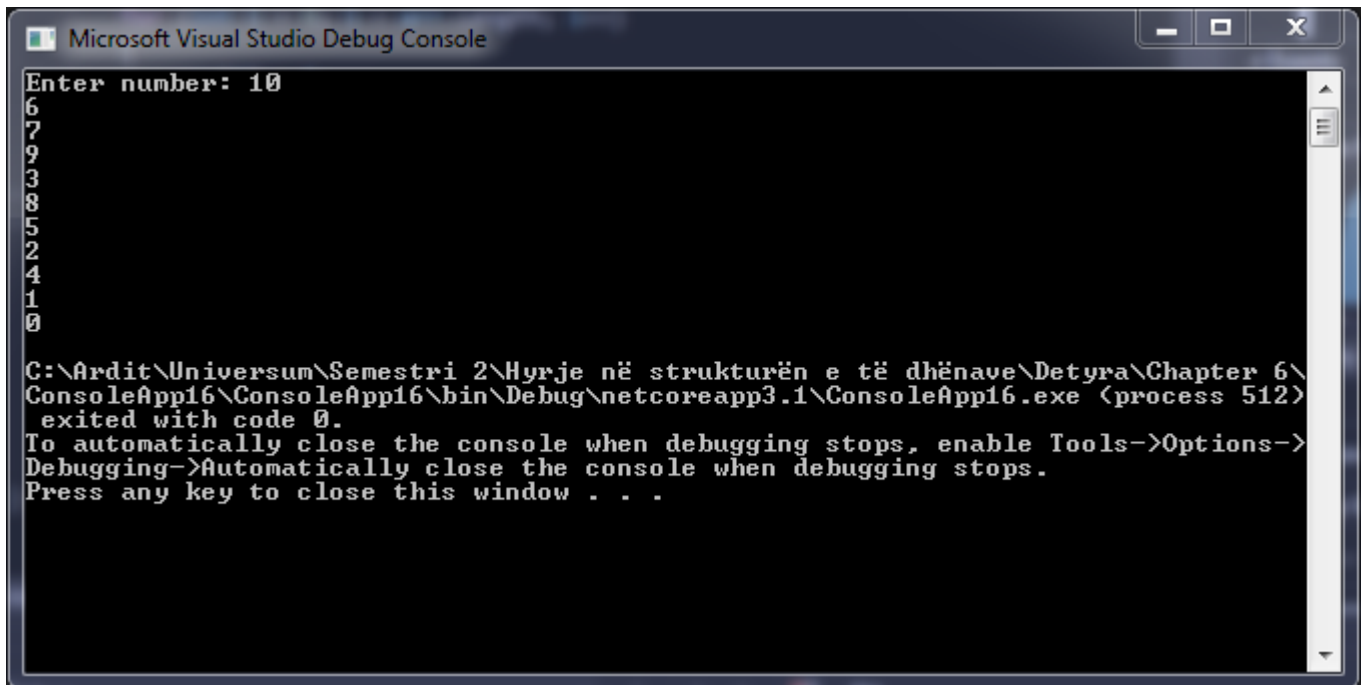
```
using System;

namespace ConsoleApp16
{
    class Program
    {
        static void Main(string[] args)
        {
            Random rnd = new Random();
            int temp, randomNumber;
            Console.Write("Enter number: ");
            int n = Int32.Parse(Console.ReadLine());
            int[] arr = new int[n];

            for (int i = 0; i < arr.Length; i++)
            {
                arr[i] = i;
            }

            foreach (int i in arr)
            {
                randomNumber = rnd.Next(0, n);
                temp = arr[i];
                arr[i] = arr[randomNumber];
                arr[randomNumber] = temp;
            }

            foreach (int i in arr) Console.WriteLine(arr[i]);
        }
    }
}
```



```
Microsoft Visual Studio Debug Console
Enter number: 10
6
7
9
3
8
5
2
4
1
0

C:\Ardit\Universum\Semestri 2\Hyrje në strukturën e të dhënave\Detyra\Chapter 6\
ConsoleApp16\ConsoleApp16\bin\Debug\netcoreapp3.1\ConsoleApp16.exe (process 512)
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 . . .
```

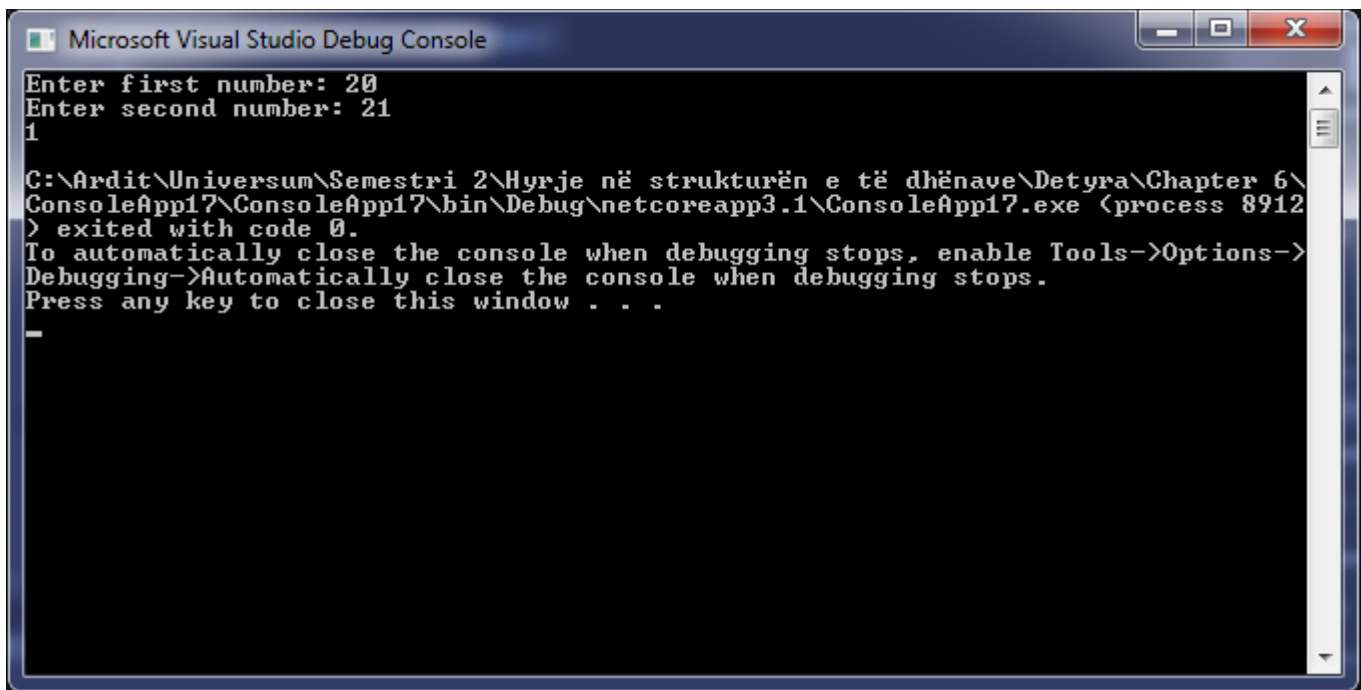
17. Write a program that given two numbers finds their **greatest common divisor (GCD)**.

```
using System;

namespace ConsoleApp17
{
    class Program
    {
        static void Main(string[] args)
        {
            Console.WriteLine("Enter first number: ");
            int a = Int32.Parse(Console.ReadLine());
            Console.WriteLine("Enter second number: ");
            int b = Int32.Parse(Console.ReadLine());

            while (a != 0 && b != 0)
            {
                if (a > b) a %= b;
                else b %= a;
            }

            if (a == 0) Console.WriteLine(b);
            else Console.WriteLine(a);
        }
    }
}
```



The screenshot shows the Microsoft Visual Studio Debug Console window. The title bar reads "Microsoft Visual Studio Debug Console". The console output is as follows:

```
Enter first number: 20
Enter second number: 21
1
C:\Ardit\Universum\Semestri 2\Hyrje në strukturën e të dhënave\Detyra\Chapter 6\
ConsoleApp17\ConsoleApp17\bin\Debug\netcoreapp3.1\ConsoleApp17.exe (process 8912
) 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 . . .
```

The output shows that the program correctly calculated the GCD of 20 and 21 as 1. The console window is currently open, waiting for a key press to close.

18. Write a program that for a given number n, outputs a matrix in the form of a **spiral**: Example with n=4:

```
using System;
```

```
namespace ConsoleApp18
```

```
{
    class Program
    {
        static void Main()
        {
            Console.Write("Enter N: ");
            int n = Int32.Parse(Console.ReadLine());
            int[,] matrix = new int[n, n];
            int row = 0, col = 0, direction = 0;

            for (int i = 1; i <= n * n; i++)
            {
                switch (direction)
                {
                    case 0:
                        if (col > n - 1 || matrix[row, col] != 0)
                        {
                            direction = 1;
                            col--;
                            row++;
                        }
                        break;
                    case 1:
                        if (row > n - 1 || matrix[row, col] != 0)
                        {
                            direction = 2;
                            row--;
                            col--;
                        }
                        break;
                    case 2:
                        if (col < 0 || matrix[row, col] != 0)
                        {
                            direction = 3;
                            col++;
                            row--;
                        }
                        break;
                    case 3:
                        if (row < 0 || matrix[row, col] != 0)
                        {
                            direction = 0;
                            row++;
                            col++;
                        }
                        break;
                }

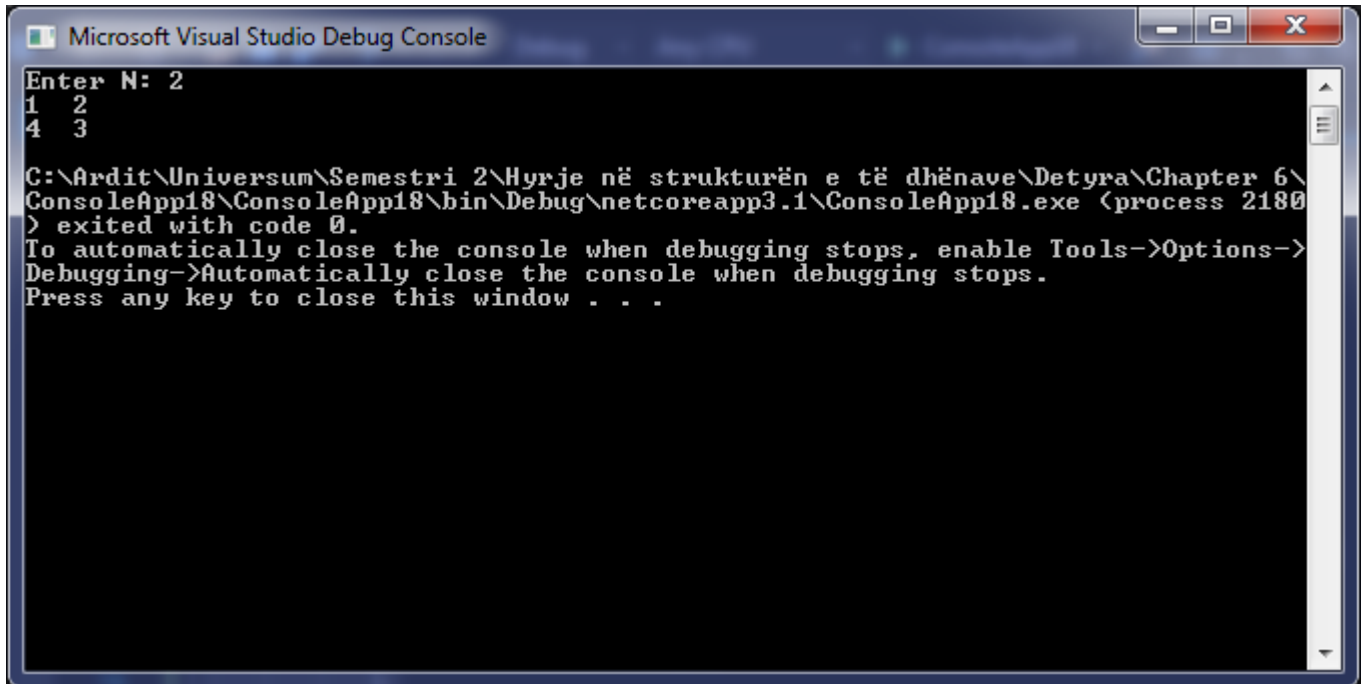
                matrix[row, col] = i;

                switch (direction)
                {
                    case 0: col++; break;
                    case 1: row++; break;
                    case 2: col--; break;
                    case 3: row--; break;
                }
            }
        }
    }
}
```

```

    for (int i = 0; i < n; i++)
    {
        for (int j = 0; j < n; j++)
        {
            if (matrix[i, j] < 10) Console.Write("{0} ", matrix[i, j]);
            else Console.Write("{0} ", matrix[i, j]);
        }
        Console.WriteLine();
    }
}
}

```



The screenshot shows the Microsoft Visual Studio Debug Console window. The title bar reads "Microsoft Visual Studio Debug Console". The console output is as follows:

```

Enter N: 2
1 2
4 3

C:\Ardit\Universum\Semestri 2\Hyrje në strukturën e të dhënave\Detyra\Chapter 6\
ConsoleApp18\ConsoleApp18\bin\Debug\netcoreapp3.1\ConsoleApp18.exe (process 2180
) 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 . . .

```