C# and .NET Frameworks Assignment 1

1.Develop the C# program to initialize two dimensional array and print all the elements of the array on the same line separated with space.

AIM:

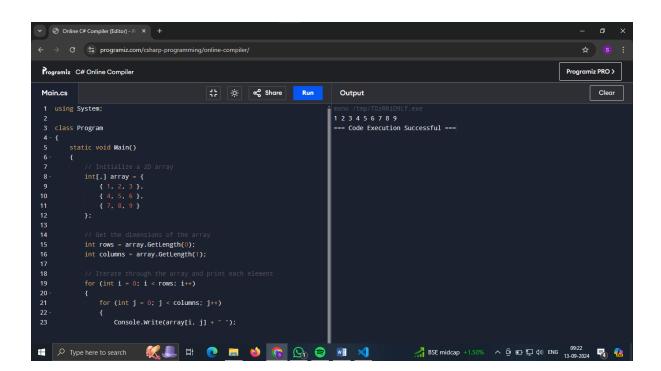
To initialize and print a 2D array containing numbers 1 to 9.

```
using System;

class Program
{
    static void Main()
    {
        // Initialize a 2D array
        int[,] array = {
            { 1, 2, 3 },
            { 4, 5, 6 },
            { 7, 8, 9 }
        };

    // Get the dimensions of the array
    int rows = array.GetLength(0);
    int columns = array.GetLength(1);
```

```
// Iterate through the array and print each element
for (int i = 0; i < rows; i++)
{
    for (int j = 0; j < columns; j++)
    {
        Console.Write(array[i, j] + " ");
    }
}</pre>
```



OUTPUT:

123456789

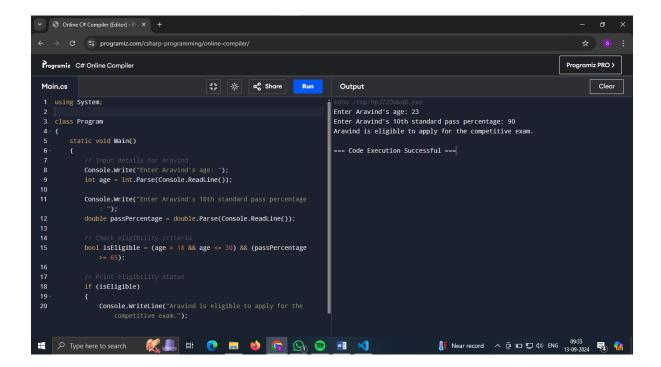
- 2. Aravind wants to apply for competitive exam. He needs to know whether he is eligible to apply. The eligibility criteria is given below:
 - Age should be greater than 18 years, but not more than 30.
 - The candidate should have passed 10 std with a minimum pass percentage of 65.

Design the C# program to help him to know his eligibility. If the criteria gets satisfied, print he is eligible else print he is not eligible

AIM:

To determine and print whether a person named Aravind is eligible to apply for a competitive exam based on their age and 10th standard pass percentage.

```
}
    else
    {
        Console.WriteLine("Aravind is not eligible to apply for the competitive exam.");
    }
}
```



Enter Aravind's age: 23

Enter Aravind's 10th standard pass percentage: 90

OUTPUT:

Aravind is eligible to apply for the competitive exam.

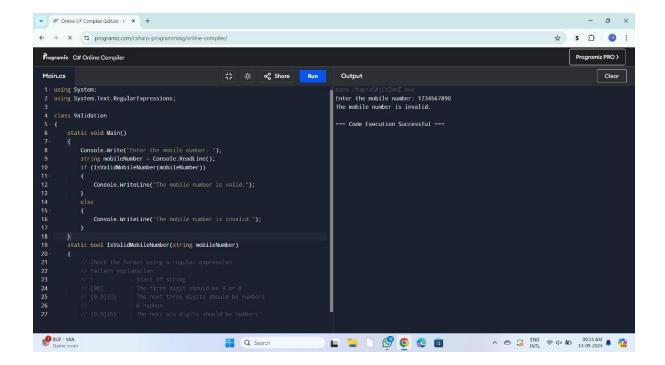
- 3.Design the C# console application named validation to get mobile number as input from the user. Validate the mobile number with the following cases:
 - The first four number must be followed by then followed by next six numbers(eg:9894-256874)
 - Should contains only numbers
 - Should be of length 10.
 - The first number should start only with 9 Or 8

AIM

To validate and print whether a given mobile number is valid or not.

```
else
    Console.WriteLine("The mobile number is invalid.");
  }
}
static bool IsValidMobileNumber(string mobileNumber)
{
  // Check the format using a regular expression
  // Pattern explanation:
  // ^
            : Start of string
         : The first digit should be 9 or 8
  // [98]
  // [0-9]{3} : The next three digits should be numbers
  // -
           : A hyphen
  // [0-9]{6} : The next six digits should be numbers
  // $
       : End of string
  string pattern = @"^[98][0-9]{3}-[0-9]{6}$";
  if (Regex.IsMatch(mobileNumber, pattern))
    return true;
  return false;
}
```

}



1234567890

OUTPUT:

The mobile number is invalid.

4. Write the missing code snippets and the statements in the C# program given below.

```
Class person {
    ____name;
    ___age;
    __weight;
Void printperson() {
    // write the code to print name, age and weight of a person
    }
}
Class persondata {
Static void Main(string[] args) {
```

```
person____ = ____;
    ____.name = "Kannan";
    ____.age = 19;
    ___.weight = 58;
// write the statement to access printperson() function
}
}
```

AIM:

To create a Person class, instantiate it, and print out the person's name, age, and weight using a method.

```
using System;

class Person
{
    public string name;
    public int age;
    public double weight;

    public void PrintPerson()
    {
        Console.WriteLine("Name: " + name);
        Console.WriteLine("Age: " + age);
        Console.WriteLine("Weight: " + weight);
    }
}
```

```
class PersonData
    static void Main(string[] args)
         Person person = new Person();
         person.name = "Kannan";
         person.age = 19;
         person.weight = 58;
         person.PrintPerson();
     }
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                                                 ને છે. જે Share Run
   1 using System;
                                                                             Name: Kannan
Age: 19
Weight: 58
        public string name;
public int age;
public double weight;
 Console.WriteLine("Name: " + name);
Console.WriteLine("Age: " + age);
Console.WriteLine("Weight: " + weight);
           Person person = new Person();
person.name = "Kannan";
person.age = 19;
person.weight = 58;
            person.PrintPerson();
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```

OUTPUT:

Name: Kannan

Age: 19

Weight: 58

- 5. A hospital wants to create a console application to maintain its impatient details. The information to store includes:
 - Name of the patient
 - Date of admission
 - Age of patient
 - Disease
 - Date of discharge
 - Total bills paid

Design the C# program with the class name patient with necessary data members to store the above information. The class should have two member functions, one to get the patients information and other to display the information. Create a main class called hospital to create necessary instances, methods calling statements and display all the details about the patient.

AIM:

To create a Patient class, collect patient information through user input, and display the collected information using methods.

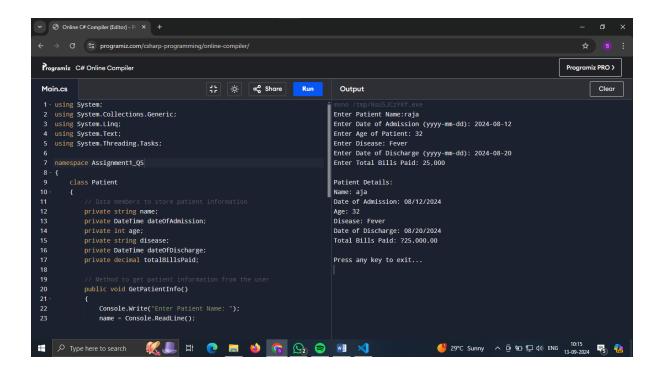
```
uaing System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
namespace Assignment1_Q5
{
    class Patient
```

```
{
  // Data members to store patient information
  private string name;
  private DateTime dateOfAdmission;
  private int age;
  private string disease;
  private DateTime dateOfDischarge;
  private decimal totalBillsPaid;
  // Method to get patient information from the user
  public void GetPatientInfo()
    Console.Write("Enter Patient Name: ");
    name = Console.ReadLine();
    Console.Write("Enter Date of Admission (yyyy-mm-dd): ");
    dateOfAdmission = DateTime.Parse(Console.ReadLine());
    Console.Write("Enter Age of Patient: ");
    age = int.Parse(Console.ReadLine());
    Console.Write("Enter Disease: ");
    disease = Console.ReadLine();
    Console.Write("Enter Date of Discharge (yyyy-mm-dd): ");
    dateOfDischarge = DateTime.Parse(Console.ReadLine());
```

```
Console.Write("Enter Total Bills Paid: ");
       totalBillsPaid = decimal.Parse(Console.ReadLine());
    }
    // Method to display patient information
    public void DisplayPatientInfo()
    {
       Console.WriteLine("\nPatient Details:");
       Console.WriteLine($"Name: {name}");
       Console.WriteLine($"Date of Admission:
{dateOfAdmission.ToShortDateString()}");
       Console.WriteLine($"Age: {age}");
       Console.WriteLine($"Disease: {disease}");
       Console.WriteLine($"Date of Discharge:
{dateOfDischarge.ToShortDateString()}");
       Console.WriteLine($"Total Bills Paid: {totalBillsPaid:C}");
    }
  class Program
    static void Main(string[] args)
       Patient patient = new Patient();
       // Get patient information
       patient.GetPatientInfo();
      // Display patient information
```

```
patient.DisplayPatientInfo();

// Wait for user input before closing
    Console.WriteLine("\nPress any key to exit...");
    Console.ReadKey();
}
```



Enter Patient Name:raja

Enter Date of Admission (yyyy-mm-dd): 2024-08-12

Enter Age of Patient: 32

Enter Disease: Fever

Enter Date of Discharge (yyyy-mm-dd): 2024-08-20

Enter Total Bills Paid: 25,000

OUTPUT:

Patient Details:

Name: aja

Date of Admission: 08/12/2024

Age: 32

Disease: Fever

Date of Discharge: 08/20/2024

Total Bills Paid: ?25,000.00

6. Implement the C# code to get two vector number as input, add them and print the sum as another vector. Make use of operator overloading to perform addition of vector numbers.

AIM:

To create a Vector class, overload the '+' operator to add two vectors, and demonstrate vector addition by taking user input for two vectors and displaying their sum.

PROGRAM:

using System;

using System.Collections.Generic;

using System.Linq;

using System.Text;

using System. Threading. Tasks;

namespace Assignment1_Q6

```
class Vector
  public int X { get; set; }
  public int Y { get; set; }
  // Constructor to initialize vector components
  public Vector(int x, int y)
     X = x;
     Y = y;
  // Overload the '+' operator to add two vectors
  public static Vector operator +(Vector v1, Vector v2)
     return new Vector(v1.X + v2.X, v1.Y + v2.Y);
  // Method to display the vector
class Program
  static void Main(string[] args)
     // Input first vector
     Console.WriteLine("Enter the first vector:");
     Console.Write("X1: ");
     int x1 = int.Parse(Console.ReadLine());
     Console.Write("Y1: ");
     int y1 = int.Parse(Console.ReadLine());
     Vector vector1 = \text{new Vector}(x1, y1);
     // Input second vector
     Console.WriteLine("Enter the second vector:");
     Console.Write("X2: ");
     int x2 = int.Parse(Console.ReadLine());
     Console.Write("Y2: ");
     int y2 = int.Parse(Console.ReadLine());
```

{

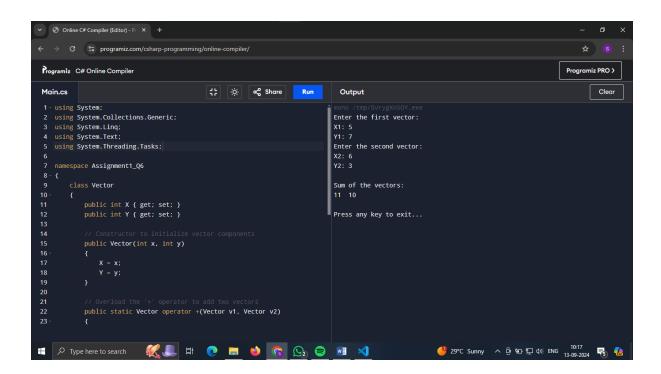
```
Vector vector2 = new Vector(x2, y2);

// Add the vectors using overloaded '+' operator
Vector sumVector = vector1 + vector2;

// Display the result
Console.WriteLine("\nSum of the vectors:");
Console.WriteLine($"{sumVector.X} {sumVector.Y}");

// Wait for user input before closing
Console.WriteLine("\nPress any key to exit...");
Console.ReadKey();

}
```



Enter the first vector:

X1: 5

Y1: 7

Enter the second vector:

X2: 6 Y2: 3

OUTPUT:

Sum of the vectors:

11 10

7. Create the class student with necessary members to maintain the basic details of a student such as name, age, address and mobile number. Add method getDate() to read the basic details and printData() to print the details of the student. Inherit the student class into the sub class called studentmark with necessary members to maintain student mark details. Override the getData() and printData() in student mark class to read mark details and print the marks, respectively. Also, define a method to find the grade of the student based on his/her marks. Design the student main class to access the member of both the classes in C#

AIM:

To create a Student class and a derived StudentMark class, which inherits and extends the base class to include mark details, calculates grades based on marks, and demonstrates polymorphism through overridden methods.

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
namespace Assignment1_Q7
{
```

```
class Student
  // Data members for basic details
  protected string name;
  protected int age;
  protected string address;
  protected string mobileNumber;
  // Method to get basic details of the student
  public virtual void getData()
    Console.Write("Enter Student Name: ");
    name = Console.ReadLine();
    Console.Write("Enter Age: ");
    age = int.Parse(Console.ReadLine());
    Console.Write("Enter Address: ");
    address = Console.ReadLine();
    Console.Write("Enter Mobile Number: ");
    mobileNumber = Console.ReadLine();
  }
  // Method to print basic details of the student
  public virtual void printData()
    Console.WriteLine("\nStudent Details:");
    Console.WriteLine($"Name: {name}");
    Console.WriteLine($"Age: {age}");
    Console.WriteLine($"Address: {address}");
    Console.WriteLine($"Mobile Number: {mobileNumber}");
  }
}
// Subclass to maintain student mark details
class StudentMark: Student
  // Data members for mark details
```

```
private int marks;
  // Override method to get student marks
  public override void getData()
     // Call base method to get basic details
     base.getData();
    Console.Write("Enter Marks: ");
     marks = int.Parse(Console.ReadLine());
  }
  // Override method to print student marks
  public override void printData()
    // Call base method to print basic details
     base.printData();
     Console.WriteLine($"Marks: {marks}");
    Console.WriteLine($"Grade: {FindGrade()}");
  }
  // Method to determine grade based on marks
  private string FindGrade()
     if (marks \geq= 90) return "A";
     else if (marks \geq 75) return "B";
     else if (marks \geq 60) return "C";
     else if (marks \geq 50) return "D";
     else return "F";
  }
class Program
  static void Main(string[] args)
     // Create an instance of the StudentMark class
     StudentMark studentMark = new StudentMark();
     studentMark.getData();
```

```
studentMark.printData();
           // Wait for user input before closing
           Console.WriteLine("\nPress any key to exit...");
           Console.ReadKey();
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                                         ਜ਼ਿੰ ਂ ਕਿ Share Run
                                                                                                                                        Clear
                                                                       Enter Student Name: Arun
 3 using System.Linq;
4 using System.Text;
                                                                       Enter Age: 19
Enter Address: Anna nagar
 5 using System.Threading.Tasks;
                                                                        Enter Mobile Number: 9514017889
                                                                        Enter Marks: 92
 7 namespace Assignment1_Q7
                                                                      Student Details:
       class Student
                                                                        Age: 19
                                                                        Address: Anna nagar
                                                                       Mobile Number: 9514017889
          protected string name;
                                                                       Marks: 92
          protected string address;
protected string mobileNumber;
                                                                       Press any key to exit...
           public virtual void getData()
              name = Console.ReadLine();
```

INPUT:

Enter Student Name: Arun

Enter Age: 19

Enter Address: Anna nagar

Enter Mobile Number: 9514017889

Enter Marks: 92

OUTPUT:

Student Details:

Name: Arun

Age: 19

Address: Anna nagar

Mobile Number: 9514017889

Marks: 92 Grade: A 8. Design sample C# program with class name employee to compute netsalary of the employee using the basic salary, if for the job_catg is 1 use table-I else use table-II. Use constructor to initialize basic salary,hra,da,pf and loan. The employee class should contain input() method to get input for job_catg, empno, empname, calculateSalary() method to compute salary and display() method to print the details.

Table-I	Table-II
BASIC=Rs. 8,000	BASIC=Rs. 15,000
HRA=10% of basic	HRA=20% of basic
DA=20% of basic	DA=30% of basic
LOAN=Rs. 300	LOAN=Rs. 600
PF=Rs. 500	PF=1000

AIM:

To create an Employee class that calculates and displays an employee's net salary based on their job category, with salary components and deductions, and demonstrates encapsulation and methods.

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

namespace Assignment1_Q8
{

    class Employee
    {

        // Data members for employee details and salary components private int empno;
        private string empname;
```

```
private int job_catg;
    private decimal basic;
    private decimal hra;
    private decimal da;
    private decimal pf;
    private decimal loan;
    private decimal netSalary;
    // Constructor to initialize salary components
    public Employee()
       // Initialization of salary components based on job category will be done
in calculateSalary()
       hra = 0;
       da = 0:
       pf = 0;
       loan = 0;
       netSalary = 0;
     }
    // Method to get employee details
    public void Input()
       Console.Write("Enter Employee Number: ");
       empno = int.Parse(Console.ReadLine());
       Console.Write("Enter Employee Name: ");
       empname = Console.ReadLine();
       Console.Write("Enter Job Category (1 for Table-I, 2 for Table-II): ");
       job_catg = int.Parse(Console.ReadLine());
     }
    // Method to calculate salary based on job category
    public void CalculateSalary()
       if (job\_catg == 1)
         // Table-I calculations
         basic = 8000;
```

```
hra = 0.10m * basic;
       da = 0.20m * basic;
       loan = 300;
       pf = 500;
    else if (job\_catg == 2)
       // Table-II calculations
       basic = 15000;
       hra = 0.20m * basic;
       da = 0.30m * basic;
       loan = 600:
       pf = 1000;
    }
    else
       Console.WriteLine("Invalid Job Category!");
       return;
     }
    // Calculate net salary
    netSalary = basic + hra + da - (pf + loan);
  }
  // Method to display employee details and salary
  public void Display()
    Console.WriteLine("\nEmployee Details:");
    Console.WriteLine($"Employee Number: {empno}");
    Console.WriteLine($"Employee Name: {empname}");
    Console.WriteLine($"Job Category: {job_catg}");
    Console.WriteLine($"Basic Salary: Rs. {basic}");
    Console.WriteLine($"HRA: Rs. {hra}");
    Console.WriteLine($"DA: Rs. {da}");
    Console.WriteLine($"Loan Deduction: Rs. {loan}");
    Console.WriteLine($"PF Deduction: Rs. {pf}");
    Console.WriteLine($"Net Salary: Rs. {netSalary}");
  }
class Program
```

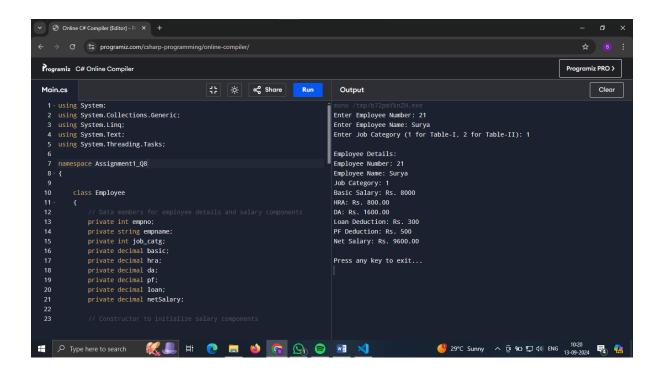
```
{
    static void Main(string[] args)
    {
        // Create an instance of the Employee class
        Employee employee = new Employee();

        // Get employee details
        employee.Input();

        // Calculate salary
        employee.CalculateSalary();

        // Display employee details and net salary
        employee.Display();

        // Wait for user input before closing
        Console.WriteLine("\nPress any key to exit...");
        Console.ReadKey();
    }
}
```



Enter Employee Number: 21 Enter Employee Name: Surya

Enter Job Category (1 for Table-I, 2 for Table-II): 1

OUTPUT:

Employee Details: Employee Number: 21 Employee Name: Surya

Job Category: 1

Basic Salary: Rs. 8000

HRA: Rs. 800.00 DA: Rs. 1600.00

Loan Deduction: Rs. 300 PF Deduction: Rs. 500 Net Salary: Rs. 9600.00

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