

Lab Assignment 3 in C#

Q 1. Create a class called Employee with properties for name, age, and salary. Implement a method to display employee details.

Ans 1. using System;

```
namespace LabAssignment3
{
    class Employee
    {

        public string Name { get; set; }
        public int Age { get; set; }
        public double Salary { get; set; }

        public Employee(string name, int age, double salary)
        {
            Name = name;
            Age = age;
            Salary = salary;
        }

        public void DisplayDetails()
        {
            Console.WriteLine("Employee Details:");
            Console.WriteLine($"Name: {Name}");
            Console.WriteLine($"Age: {Age}");
            Console.WriteLine($"Salary: {Salary:C}");
        }
    }

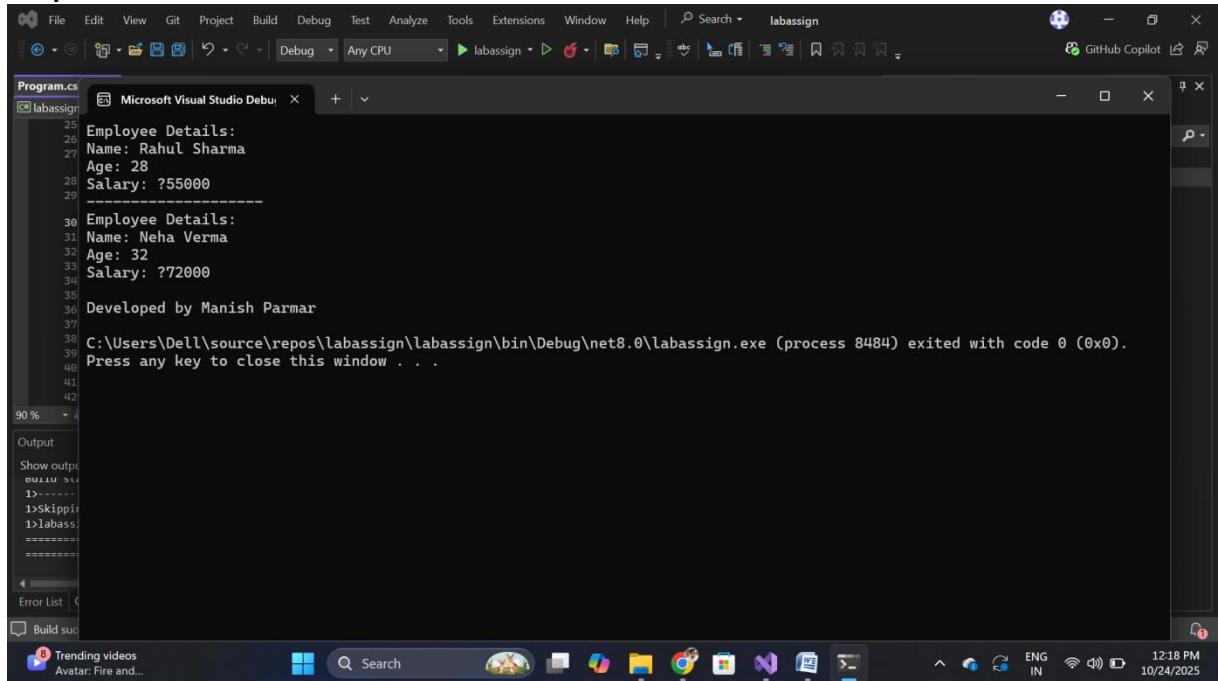
    class Program
    {
        static void Main(string[] args)
        {

            Employee emp = new Employee("John Doe", 30, 55000);

            emp.DisplayDetails();

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

Output:



```
Employee Details:  
Name: Rahul Sharma  
Age: 28  
Salary: ?55000  
-----  
Employee Details:  
Name: Neha Verma  
Age: 32  
Salary: ?72000  
Developed by Manish Parmar  
C:\Users\Dell\source\repos\labassign\labassign\bin\Debug\net8.0\labassign.exe (process 8484) exited with code 0 (0x0).  
Press any key to close this window . . .
```

Q 2. Create a class called BankAccount with properties for account number, account holder name, and balance. Implement methods for deposit, withdrawal, and displaying the account details.

Ans 2. `using System;`

```
namespace LabAssignment3
{
    class BankAccount
    {
        public string AccountNumber { get; set; }
        public string AccountHolderName { get; set; }
        public double Balance { get; set; }

        public BankAccount(string accountNumber, string accountHolderName, double
balance)
        {
            AccountNumber = accountNumber;
            AccountHolderName = accountHolderName;
            Balance = balance;
        }

        public void Deposit(double amount)
        {
            Balance += amount;
        }

        public void Withdraw(double amount)
        {
            if (amount <= Balance)
                Balance -= amount;
            else
                Console.WriteLine("Insufficient balance.");
        }
    }
}
```

```

public void DisplayAccountDetails()
{
    Console.WriteLine($"Account Number: {AccountNumber}");
    Console.WriteLine($"Account Holder Name: {AccountHolderName}");
    Console.WriteLine($"Balance: {Balance:C}");
}

class frogram
{
    static void Main(string[] args)
    {
        BankAccount account = new BankAccount("123456", "Alice Johnson",
1000);
        account.Deposit(500);
        account.Withdraw(200);
        account.DisplayAccountDetails();
        Console.ReadLine();
        Console.WriteLine("Developed by Manish Parmar.");
    }
}

```

Output:

The screenshot shows the Microsoft Visual Studio interface with the output window open. The output window displays the results of running the program, which creates three bank account instances and prints their details. The first instance is for Alice Johnson with an account number of 123456, a balance of 1000, and details of a deposit of 500 and a withdrawal of 200. The second instance is for Aarti Sharma with an account number of ACC102, a balance of 10000, and details of a deposit of 2000 and a withdrawal of 1500. The third instance is for Manish Parmar with an account number of ACC101, a balance of 5500, and a deposit of 5000. The developer's name, Manish Parmar, is also printed at the end.

```

71 Account Holder Name: Manish Parmar
72 Balance : ?5000
73 -----
74 === Bank Account Details ===
75 Account Number : ACC102
76 Account Holder Name: Aarti Sharma
77 Balance : ?10000
78 -----
79 ?2000 deposited successfully.
80 ?1500 withdrawn successfully.
81 ? Insufficient balance.
82 ?5000 deposited successfully.
83 -----
84 === Bank Account Details ===
85 Account Number : ACC101
86 Account Holder Name: Manish Parmar
87 Balance : ?5500
88 -----
89 === Bank Account Details ===
90 Account Number : ACC102
91 Account Holder Name: Aarti Sharma
92 Balance : ?15000
93 -----
94 Developed by Manish Parmar

```

Q 3. Create a static utility class named MathHelper with a static method CalculateAverage that takes an array of integers as input and returns their average.

Ans 3. `using System;`

```

namespace LabAssignment3
{
    static class MathHelper
    {
        public static double CalculateAverage(int[] numbers)
        {
            if (numbers == null || numbers.Length == 0)
                return 0;

            double sum = 0;

```

```

        foreach (int num in numbers)
            sum += num;

        return sum / numbers.Length;
    }

    class flrogram
    {
        static void Main(string[] args)
        {
            int[] values = { 10, 20, 30, 40, 50 };
            double average = MathHelper.CalculateAverage(values);
            Console.WriteLine($"Average: {average}");
            Console.ReadLine();
            Console.WriteLine("Developed by Manish Parmar.");
        }
    }
}

```

Output:

The screenshot shows the Microsoft Visual Studio interface with the 'Program.cs' file open. The 'Output' window displays the following text:

```

Average of first array: 30
Average of second array: 15

Developed by Manish Parmar

C:\Users\DELL\source\repos\labassign\labassign\bin\Debug\net8.0\labassign.exe (process 10604) exited with code 0 (0x0).
Press any key to close this window . .

```

The status bar at the bottom shows system information like battery level (80%, 30°C, Sunny), network connection, and the date/time (10/24/2025, 12:21 PM).

Q 4. Implement a static logger class called Logger that has a method LogMessage for writing messages on console. Demonstrate its usage in a simple console application.

Ans 4. `using System;`

```

namespace LabAssignment3
{
    static class Logger
    {
        public static void LogMessage(string message)
        {
            Console.WriteLine($"[{DateTime.Now}] {message}");
        }
    }

    class flrogram
    {
        static void Main(string[] args)

```

```

    {
        Logger.LogMessage("Application started.");
        Logger.LogMessage("Processing data...");
        Logger.LogMessage("Application ended.");
        Console.ReadLine();
        Console.WriteLine("Developed by Manish Parmar.");
    }

}

```

Output:

The screenshot shows the Microsoft Visual Studio interface. In the center, there is a 'Microsoft Visual Studio Debug' window titled 'Program.cs' with the code provided above. Below this window, the 'Output' window shows the following text:

```

    === Logger Demo ===
[10/24/2025 12:22:49 PM] Application started.
[10/24/2025 12:22:50 PM] Performing some operations...
[10/24/2025 12:22:50 PM] An error occurred while processing data.
[10/24/2025 12:22:50 PM] Application ended.

Developed by Manish Parmar

C:\Users\... source\repos\labassign\labassign\bin\Debug\net8.0\labassign.exe (process 14220) exited with code 0 (0x0).
Press any key to close this window . .

```

At the bottom of the screen, the Windows taskbar shows the date and time as 10/24/2025 12:22 PM.

Q 5. Define a partial class Person with one part containing properties like FirstName and LastName, and another part with methods like PrintFullName to display the full name. Implement these parts in separate files.

Ans 5. `using System;`

```

namespace LabAssignment3
{
    public partial class flerson
    {
        public string FirstName { get; set; }
        public string LastName { get; set; }
    }

    public partial class flerson
    {
        public void flprintFullName()
        {
            Console.WriteLine($"Full Name: {FirstName} {LastName}");
        }
    }

    class flrogram
    {
        static void Main(string[] args)
        {
            flerson person = new flerson
        }
    }
}

```

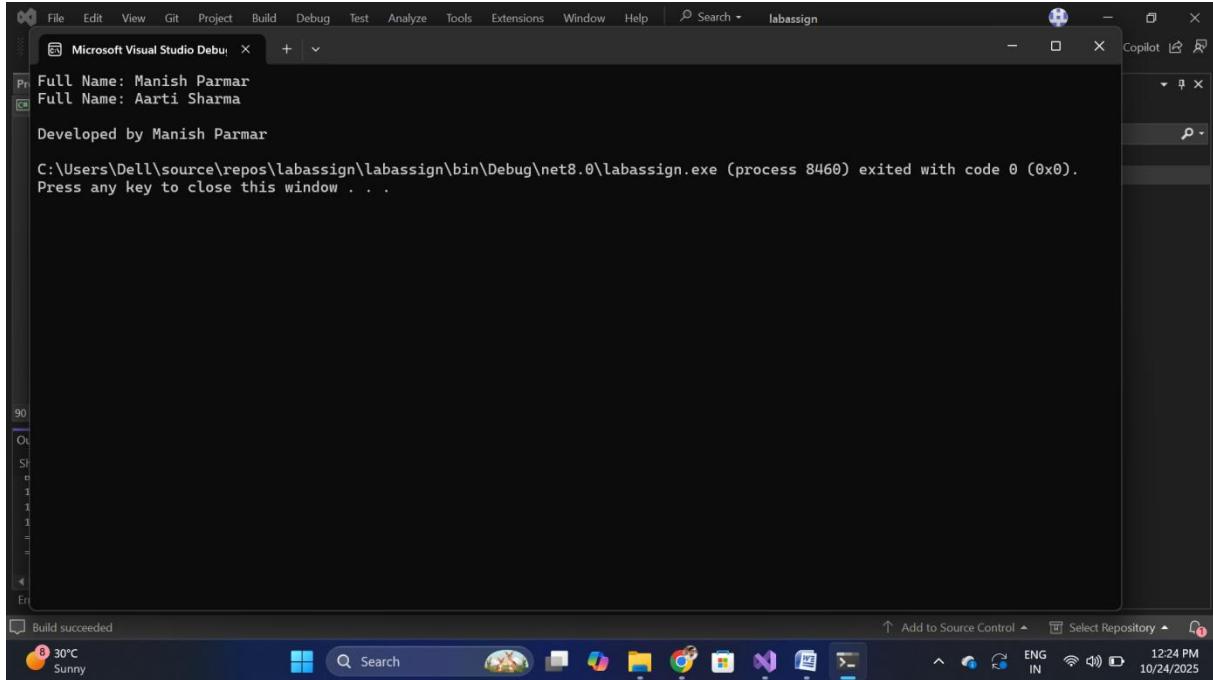
```

    {
        FirstName = "John",
        LastName = "Doe"
    };

    person.printFullName();
    Console.ReadLine();
    Console.WriteLine("Developed by Manish Parmar.");
}
}

```

Output:



The screenshot shows the Microsoft Visual Studio Debug window. The output pane displays the following text:

```

Pr Full Name: Manish Parmar
Full Name: Aarti Sharma

Developed by Manish Parmar

C:\Users\...\\bin\Debug\net8.0\labassign.exe (process 8460) exited with code 0 (0x0).
Press any key to close this window . .

```

The status bar at the bottom indicates a build succeeded and shows system information like weather (30°C Sunny), battery level (ENG IN), and date/time (10/24/2025).

Q 6. Create a partial class Employee with properties representing employee details. In another part, implement methods for calculating salary based on different factors.

Ans 6. `using System;`

```

namespace LabAssignment3
{
    public partial class Employee
    {
        public string Name { get; set; }
        public int Age { get; set; }
        public double BaseSalary { get; set; }
        public double Bonus { get; set; }
        public double Deduction { get; set; }
    }

    public partial class Employee
    {
        public double CalculateNetSalary()
        {
            return BaseSalary + Bonus - Deduction;
        }

        public void DisplaySalaryDetails()
        {
            Console.WriteLine($"Employee Name: {Name}");
        }
    }
}

```

```

        Console.WriteLine($"Age: {Age}");
        Console.WriteLine($"Base Salary: {BaseSalary:C}");
        Console.WriteLine($"Bonus: {Bonus:C}");
        Console.WriteLine($"Deduction: {Deduction:C}");
        Console.WriteLine($"Net Salary: {CalculateNetSalary():C}");
    }

}

class frogram
{
    static void Main(string[] args)
    {
        Employee emp = new Employee
        {
            Name = "Alice Smith",
            Age = 28,
            BaseSalary = 50000,
            Bonus = 5000,
            Deduction = 2000
        };

        emp.DisplaySalaryDetails();
        Console.ReadLine();
        Console.WriteLine("Developed by Manish Parmar.");
    }
}

```

Output:

The screenshot shows the Microsoft Visual Studio IDE with the Output window open. The window displays the following text:

```

== Employee Details ==
Name      : Manish Parmar
Age       : 28
BasicSalary: ?50000
Bonus     : ?5000
TotalSalary: ?55000
Salary after 10% tax: ?49500
-----
== Employee Details ==
Name      : Aarti Sharma
Age       : 32
BasicSalary: ?60000
Bonus     : ?8000
TotalSalary: ?68000
Salary after 10% tax: ?61200
-----
Developed by Manish Parmar

```

Below the output, the status bar shows the path: C:\Users\... and the message: Press any key to close this window

Q 7. Define an abstract base class Shape with an abstract method CalculateArea. Derive classes like Circle and Rectangle from Shape and implement the area calculation methods for each.

Ans 7. `using System;`

```

namespace LabAssignment3
{
    public abstract class Shape
    {

```

```

        public abstract double CalculateArea();
    }

public class Circle : Shape
{
    public double Radius { get; set; }

    public Circle(double radius)
    {
        Radius = radius;
    }

    public override double CalculateArea()
    {
        return Math.PI * Radius * Radius;
    }
}

public class Rectangle : Shape
{
    public double Width { get; set; }
    public double Height { get; set; }

    public Rectangle(double width, double height)
    {
        Width = width;
        Height = height;
    }

    public override double CalculateArea()
    {
        return Width * Height;
    }
}

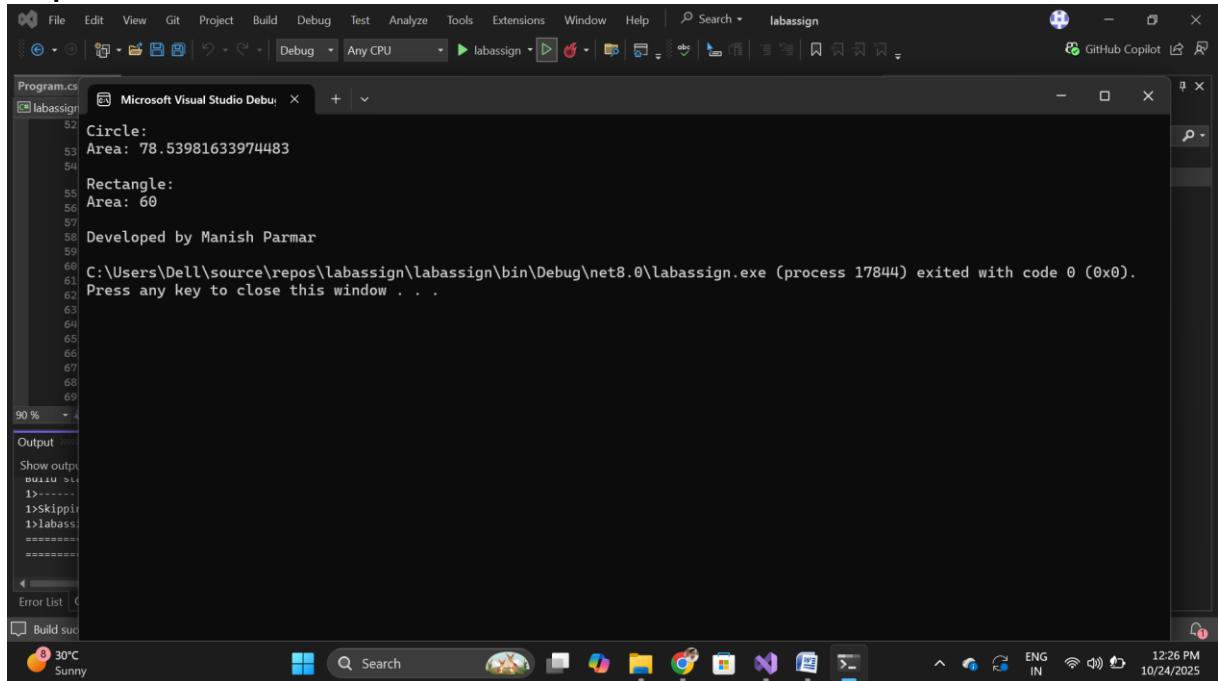
class frogram
{
    static void Main(string[] args)
    {
        Shape circle = new Circle(5);
        Shape rectangle = new Rectangle(4, 6);

        Console.WriteLine($"Circle Area: {circle.CalculateArea():F2}");
        Console.WriteLine($"Rectangle Area: {rectangle.CalculateArea():F2}");

        Console.ReadLine();
        Console.WriteLine("Developed by Manish Parmar.");
    }
}

```

Output:



The screenshot shows the Microsoft Visual Studio IDE running on a Windows 10 desktop. The title bar says 'labassign'. The main window displays the output of a C# program named 'Program.cs'.

```
Microsoft Visual Studio Debug: Program.cs
Circle:
Area: 78.53981633974483
Rectangle:
Area: 60
Developed by Manish Parmar
C:\Users\Dell\source\repos\labassign\labassign\bin\Debug\net8.0\labassign.exe (process 17844) exited with code 0 (0x0).
Press any key to close this window . . .
90 %
Output
Show output
Error List
Build succ
30°C Sunny
12:26 PM 10/24/2025
```

The output window shows the following text:

```
Circle:
Area: 78.53981633974483
Rectangle:
Area: 60
Developed by Manish Parmar
C:\Users\Dell\source\repos\labassign\labassign\bin\Debug\net8.0\labassign.exe (process 17844) exited with code 0 (0x0).
Press any key to close this window . . .
```

Q 8. Design an abstract class Animal with properties like Name and Age. Derive classes like Dog and Cat from Animal with their unique methods.

Ans 8. using System;

```
namespace LabAssignment3
{
    public abstract class Animal
    {
        public string Name { get; set; }
        public int Age { get; set; }

        public abstract void MakeSound();
    }

    public class Dog : Animal
    {
        public void Fetch()
        {
            Console.WriteLine($"{Name} is fetching the ball!");
        }

        public override void MakeSound()
        {
            Console.WriteLine($"{Name} says: Woof! Woof!");
        }
    }

    public class Cat : Animal
    {
        public void Scratch()
        {
            Console.WriteLine($"{Name} is scratching the furniture!");
        }

        public override void MakeSound()
        {
```

```

        Console.WriteLine($"{Name} says: Meow!");
    }

}

class flrogram
{
    static void Main(string[] args)
    {
        Dog dog = new Dog { Name = "Buddy", Age = 3 };
        Cat cat = new Cat { Name = "Whiskers", Age = 2 };

        dog.MakeSound();
        dog.Fetch();

        cat.MakeSound();
        cat.Scratch();

        Console.ReadLine();
        Console.WriteLine("Developed by Manish Parmar.");
    }
}

```

Output:

The screenshot shows the Microsoft Visual Studio interface with the 'labassign' project open. The 'Output' window is active, displaying the following text:

```

67
68
69 Name: Buddy, Age: 3
70 Dog says: Woof! Woof!
71 Buddy is fetching the ball!
72
73
74 Name: Whiskers, Age: 2
75 Cat says: Meow! Meow!
76 Whiskers is scratching the furniture!
77
78 Developed by Manish Parmar
79
80
81 C:\Users\DELL\source\repos\labassign\labassign\bin\Debug\net8.0\labassign.exe (process 4040) exited with code 0 (0x0).
82 Press any key to close this window . .
83
84
85
86

```

The status bar at the bottom indicates it's a sunny day at 30°C.

Q 9. Create a base class Vehicle with methods like StartEngine and StopEngine. Derive a class Car from Vehicle and seal it. Try to create a class that inherits from Car and observe the behavior.

Ans 9. `using System;`

```

namespace VLabAssignment3
{
    public class Vehicle
    {
        public void StartEngine()
        {
            Console.WriteLine("Engine started.");
        }
}

```

```

public void StopEngine()
{
    Console.WriteLine("Engine stopped.");
}

public sealed class Car : Vehicle
{
    public void Drive()
    {
        Console.WriteLine("Car is driving.");
    }
}

class Program
{
    static void Main(string[] args)
    {
        Car car = new Car();
        car.StartEngine();
        car.Drive();
        car.StopEngine();

        Console.ReadLine();
        Console.WriteLine("Developed by Manish Parmar.");
    }
}

```

Output:

The screenshot shows the Microsoft Visual Studio interface with the 'Output' window open. The window displays the following text:

```

34
35
36
37 Engine started.
38 Car is honking: Beep! Beep!
39 Engine stopped.
40
41 Developed by Manish Parmar
42
43 C:\Users\DELL\source\repos\labassign\labassign\bin\Debug\net8.0\labassign.exe (process 16868) exited with code 0 (0x0).
44 Press any key to close this window . .
45
46
47
48
49
50
51

```

The 'Output' tab is selected in the bottom-left corner of the window.

Q 10. Design a class `BankAccount` with properties like `AccountNumber` and `Balance`. Implement a sealed class `SavingsAccount` that extends `BankAccount` with methods for interest calculation.

Ans 10. `using System;`

```

namespace LabAssignment3
{
    public class BankAccount

```

```

{
    public string AccountNumber { get; set; }
    public double Balance { get; set; }

    public BankAccount(string accountNumber, double balance)
    {
        AccountNumber = accountNumber;
        Balance = balance;
    }

    public void Deposit(double amount)
    {
        Balance += amount;
        Console.WriteLine($"Deposited: {amount:C}. New Balance:
{Balance:C}");
    }

    public void Withdraw(double amount)
    {
        if (amount <= Balance)
        {
            Balance -= amount;
            Console.WriteLine($"Withdrawn: {amount:C}. New Balance:
{Balance:C}");
        }
        else
        {
            Console.WriteLine("Insufficient balance.");
        }
    }

    public void DisplayAccountDetails()
    {
        Console.WriteLine($"Account Number: {AccountNumber}");
        Console.WriteLine($"Balance: {Balance:C}");
    }
}

public sealed class SavingsAccount : BankAccount
{
    public double InterestRate { get; set; }

    public SavingsAccount(string accountNumber, double balance, double
interestRate)
        : base(accountNumber, balance)
    {
        InterestRate = interestRate;
    }

    public void ApplyInterest()
    {
        double interest = Balance * InterestRate / 100;
        Balance += interest;
        Console.WriteLine($"Interest Applied: {interest:C}. New Balance:
{Balance:C}");
    }
}

class flrogram
{
    static void Main(string[] args)
    {
        SavingsAccount savings = new SavingsAccount("SA12345", 1000, 5);
    }
}

```

```

        savings.DisplayAccountDetails();
        savings.Deposit(500);
        savings.ApplyInterest();
        savings.Withdraw(300);
        savings.DisplayAccountDetails();

        Console.ReadLine();
        Console.WriteLine("Developed by Manish Parmar.");
    }
}

```

Output:

The screenshot shows the Microsoft Visual Studio interface with the following details:

- Code Editor:** Displays the `Program.cs` file with the provided C# code.
- Output Window:** Shows the console output from the application run. It includes:
 - Account Number: SA101, Balance: ?5000
 - ?2000 deposited successfully.
 - ?1000 withdrawn successfully.
 - Interest of 5% added: ?300
 - Account Number: SA101, Balance: ?6300
 - Developed by Manish Parmar
- Build Log:** Shows the build process for the project `labassign`.
- System Tray:** Shows the weather (30°C, Sunny) and system status (ENG IN, 12:30 PM, 10/24/2025).