

TASK 1: Unit Testing with NUnit

Calculator.cs (Main Project - NUnitDemo)

```
namespace NUnitDemo
{
    public class Calculator
    {
        public int Add(int a, int b) => a + b;
        public int Subtract(int a, int b) => a - b;
        public int Multiply(int a, int b) => a * b;
        public double Divide(int a, int b)
        {
            if (b == 0) throw new DivideByZeroException();
            return (double)a / b;
        }
    }
}
```

CalculatorTests.cs (Test Project - NUnitDemo.Tests)

```
using NUnit.Framework;
using NUnitDemo;

namespace NUnitDemo.Tests
{
    public class CalculatorTests
    {
        private Calculator _calc;

        [SetUp]
        public void Setup()
        {
            _calc = new Calculator();
        }

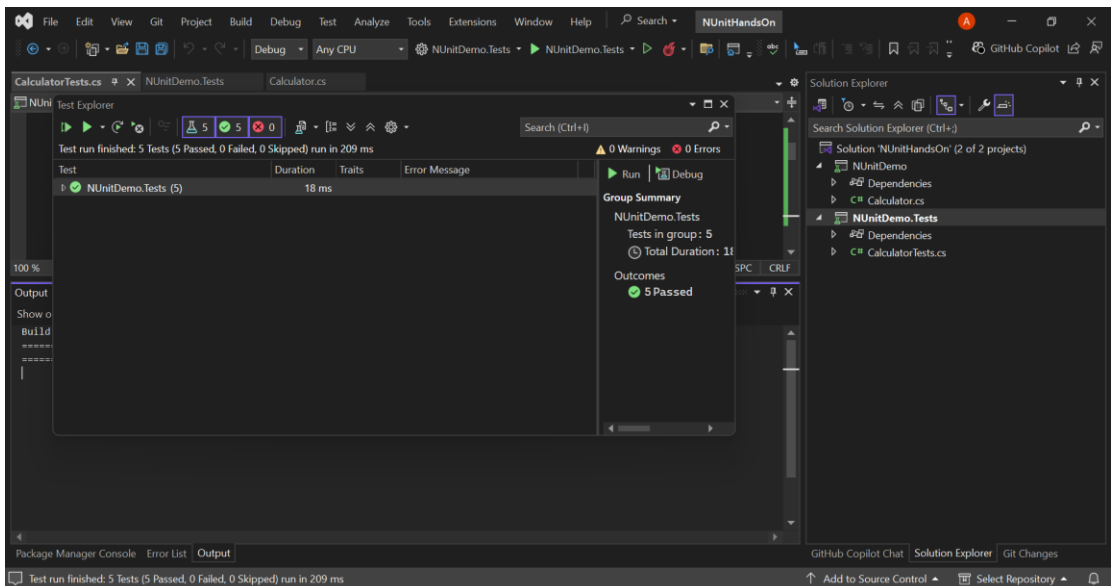
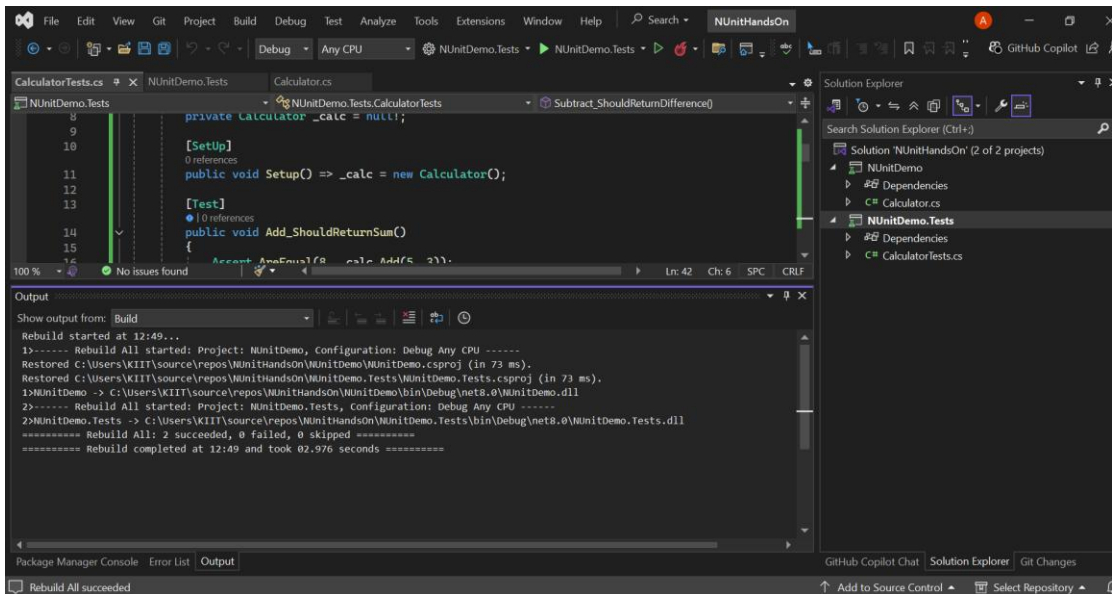
        [Test]
        public void Add_ShouldReturnSum()
        {
            Assert.AreEqual(8, _calc.Add(5, 3));
        }

        [Test]
        public void Subtract_ShouldReturnDifference()
        {
            Assert.AreEqual(2, _calc.Subtract(5, 3));
        }

        [Test]
        public void Multiply_ShouldReturnProduct()
        {
            Assert.AreEqual(15, _calc.Multiply(5, 3));
        }

        [Test]
        public void Divide_ShouldReturnQuotient()
        {
            Assert.AreEqual(5.0, _calc.Divide(10, 2));
        }

        [Test]
        public void Divide_ByZero_ShouldThrowException()
        {
            Assert.Throws<DivideByZeroException>(() => _calc.Divide(5, 0));
        }
    }
}
```



TASK 2: Moq-Based Unit Testing

IUserService.cs (Main Project - NUnitDemo)

```
namespace NUnitDemo
{
    public interface IUserService
    {
        string GetUsername(int userId);
    }
}
```

UserManager.cs (Main Project - NUnitDemo)

```
namespace NUnitDemo
{
    public class UserManager
    {
        private readonly IUserService _userService;

        public UserManager(IUserService userService)
        {
            _userService = userService;
        }

        public string GetGreeting(int userId)
        {
            var name = _userService.GetUsername(userId);
            return $"Hello, {name}!";
        }
    }
}
```

UserManagerTests.cs (Test Project - NUnitDemo.Tests)

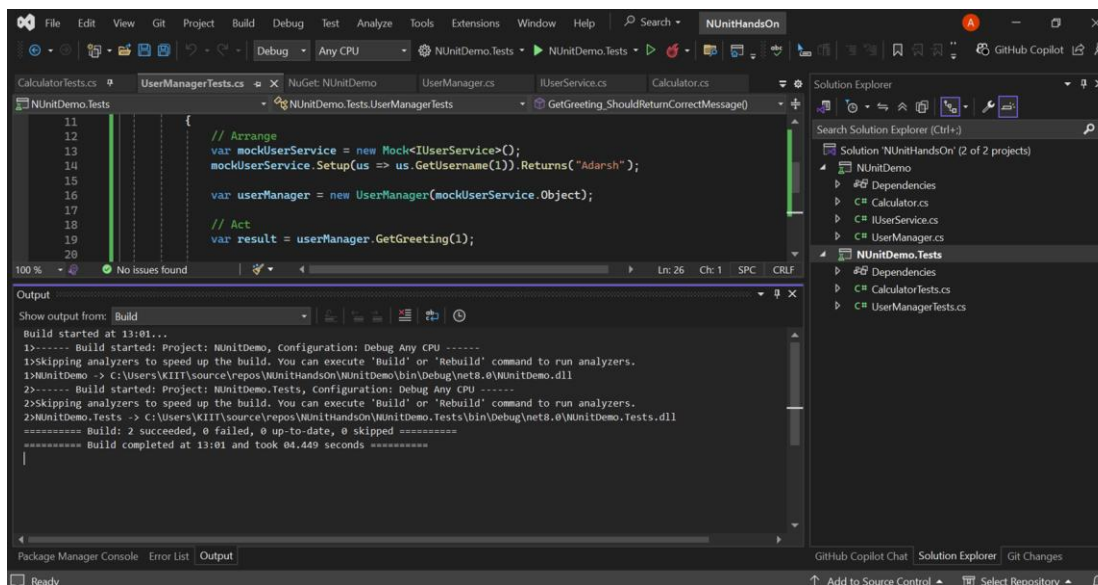
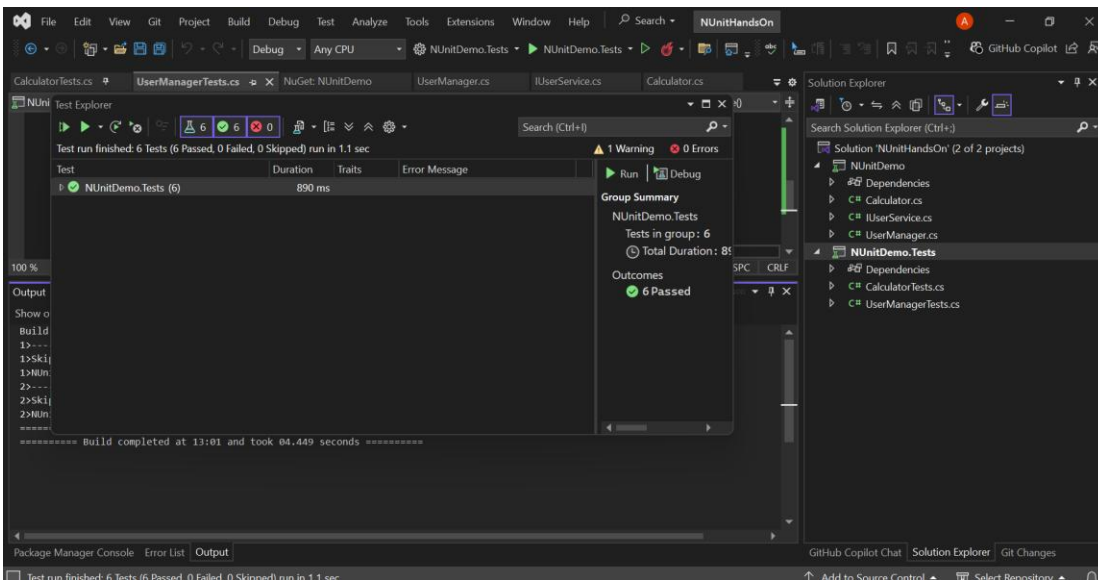
```
using Moq;
using NUnit.Framework;
using NUnitDemo;

namespace NUnitDemo.Tests
{
    public class UserManagerTests
    {
        [Test]
        public void GetGreeting_ShouldReturnCorrectMessage()
        {
            // Arrange
            var mockUserService = new Mock<IUserService>();
            mockUserService.Setup(us => us.GetUsername(1)).Returns("Adarsh");

            var userManager = new UserManager(mockUserService.Object);

            // Act
            var result = userManager.GetGreeting(1);

            // Assert
            Assert.AreEqual("Hello, Adarsh!", result);
        }
    }
}
```



Required NuGet Packages (install in NUnitDemo.Tests)

Install-Package NUnit -Version 3.13.3

Install-Package NUnit3TestAdapter -Version 4.5.0

Install-Package Microsoft.NET.Test.Sdk -Version 17.10.0

Install-Package Moq