Application Development with .NET (32998, 31927)

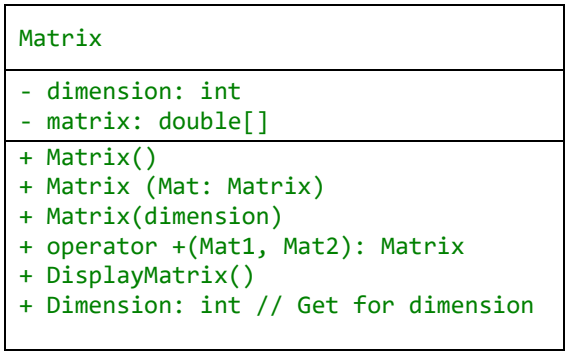
Tutorial -4 Questions

Please download the sample code from Canvas and follow the instructions

Program 1:

Write a program to define a **Matrix** class which can add two square matrices using Operator Overloading. The Matrix class should have constructor to accept the dimension of the matrix as user input. The user will then be asked to populate the matrices. The class should also have a copy constructor. The Matrix class should have a method to display the input matrix and matrix addition result. There should be a special method for '+' operator overloading which takes two matrices as arguments and returns an output matrix.

The Matrix objects should be created in the class containing the main() method. Please use the below class diagram:



The matrix object should be initialized with constructors.
DisplayInput(): displays the input Matrix,
DisplayResult(): displays the result after addition.
operator+(Mat1: Matrix, Mat2: Matrix): Adds two matrix and returns the result matrix.

Example:

Enter the dimension for the square matrix: 2
Enter the matrix element (0,0): 1
Enter the matrix element (0,1): 1
Enter the matrix element (1,0): 1
Enter the matrix element (1,1): 1
1 1
1 1

Enter the dimension for the square matrix: 2
Enter the matrix element (0,0): 2
Enter the matrix element (0,1): 2
Enter the matrix element (1,0): 2
Enter the matrix element (1,1): 2

The input matrix is:
2 2
2 2

The sum of two matrices is:
3 3
3 3

Optional: Add the code for overloading '-' operator to subtract two matrices.

Reference: https://en.wikipedia.org/wiki/Matrix_addition

Program 2:

Write a program to Create a **QuadraticEquation** class as per the below specification

QuadraticEquation
- a, b, c : double - real_val: double - img_val : double
+ QuadraticEquation() + QuadraticEquation (double a, double b, double c) + solveEquation() :void + DisplayEquation(): void + DisplayResult() :void

1. Contructor accepts the three coefficients according to the quadratic equation form
2. Default Constructor: Initializes the coefficients to 1.
3. Solve(): Solves the quadratic equation for given coefficients using the formula.
4. DisplayEquation(): Displays the equation
5. DisplayResult(): Displays the results

In the **Main**() method:

1. Create an Object of the **QuadraticEquation** class
2. Call the **QuadraticEquation** (double a, double b, double c) constructor for initializing the coefficients.
3. Call solve() to solve the equation
4. Call Display equation and the result

Example Test case:

Enter the Coefficient Values for Coefficient a: 2

Enter the Coefficient Values for Coefficient b: 2

Enter the Coefficient Values for Coefficient c: 1

The Equation is:

2x^2 + 2x + 1 = 0

The Result is: x= -0.5, 0.5

Hint:

Quadratic equation form is:

$$ax^2 + bx + c = 0$$

Formula for solving it is:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Use **Math.Sqrt()** for square root.

Check If $(b^2 – 4ac) > 0$: The equation has two Real solutions

Check if $(b^2 – 4ac) < 0$: The equation has Imaginary solutions

Check if $(b^2 – 4ac) = 0$: The equation has one real solution