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Semestral Project programmer documentation

Written in c# language.

To run the program it will need to install .NET 7.0 framework and IDE.

General information

The program is constructed to help to compute different operations with matrices (such as addition, multiplication, finding inverse, and determinant).

Program.cs file

Class: Matrix

Purpose: it is the main and the only class in this project, where all operations are written. The namespace is used here, to be able to use our class inside other programs, if provide them with the reference. For example, it is used in **UnitTest1.cs** file for unit tests.

Operations:

add(Matrix a, Matrix b) – add two matrices a and b, with the straightforward algorithm.

Matrixread(double[,] s) – reads the entries of a matrix from the rectangular array.

Mult(Matrix a, Matrix b) – multiply two matrices a and b, with the straightforward algorithm.

Det() – compute the determinant of a matrix using Gaussian elimination algorithm

Inverse() – find the inverse matrix, via computing an adjugate matrix.

Mat() – returns the entries of a matrix.

Private functions helping with auxiliary needs:

transpose() – find the matrix transpose.

Cofactor(int i, int j, matrix a) – compute the cofactor of a matrix a in position i, j.

Temp(int n, int m) – returns a matrix without n-th row and m-th column.

Main() function:

It asks for a MATLAB input of a matrix (i.e. [1, 2, 3; 4, 5, 6; 7, 8, 9]) and then it gives a result for a necessary command.

There are 5 types of commands: **add**, **mult**, **det**, and **inverse** whose names correspond to what they are supposed to do. Also, there is a command **exit**, which terminates the process.

If an operation cannot be computed on your input (if the dimensions of matrices are different for addition, for example), it will ask you to choose an operation again and type a matrix again.

UniTest1.cs

Class: UniTest1

Purpose: this is the xUnit tests file, which checks whether the program works properly.

Operations:

There are only 4 functions, named test1, test2, test3, test4:

- Test1() – checks for matrix determinant
- Test2() – checks for matrix addition
- Test3() – checks for matrix multiplication
- Test4() – checks for matrix inverse

All tests are passed

In case to run these tests correctly, I had to remove a Main function from the Program.cs file and add namespace MatrixClass before writing the class. It was done by using MatrixClass and its functions in the UniTest1.cs file.