

Task

To create type **Matrix**, which encapsulates two-dimensional array-matrix block of real (double) type.

Matrix is the cover for two-dimensional array of real values, storing matrix values with operations of matrix addition, deduction and multiplication.

Real type values (double) can be in matrix, specifying during creation, the number of array rows and columns, which will store these values. After creation, the number of rows and columns are not changed. Values to matrix elements can be set while creating matrix, and later with the help of indexer.

Matrix can provide information regarding the number of array rows and columns, receive array elements in form of two-dimensional standard array, add, deduct and multiply matrixes compatible by size. If a user is trying to perform operations with matrix of incompatible sizes – user type exceptions **MatrixException** are thrown from operations. Other matrix methods also throw exceptions, if a user applies them incorrectly (conveys incorrect parameters into constructor, in indexer – non-existing index and so on)

Matrixes can be cloned and compared with one another (content encapsulated in matrix array is used for comparison).

The task has two levels of complexity: **Low** and **Advanced**

Low level requires implementation of the following functionality:

- Creating of empty matrix with predetermined number of rows and columns (all values in matrix equal 0).
- Creating of matrix based on existing two-dimensional array.
- Receiving of number of matrix rows and columns.
- Receiving of standard two-dimensional array out of matrix.
- Access to recording and reading of elements via predetermined correct index (indexer).
- Method of matrixes addition.
- Method of matrixes deduction.
- Method of matrixes multiplication.

Advanced level requires implementation of the following functionality:

- All completed tasks of **Low** level.
- Overloaded operation “+” for matrixes addition.
- Overloaded operation “-” for matrixes deduction.
- Overloaded operation “*” for matrixes multiplication
- Define class of user exception **MatrixException**
- Raise exceptions specified in xml-comments to class methods (standard and user).
- Implementation of interface **ICloneable**
- Implementation of method **Equals**