COSC346- Assignment 1

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Vector:

The vector library which extends BasicVector and VectorToMatrix has two data fields set in initialization; size and vec. Vec is an array of type T that can be int, double, float, Fraction or Complex and size is the size of the vector set by the init argument. We decided to use vector as the parent class within the OO relationship between the vector and matrix classes because it meant that we would only be dealing with a 1-dimenstional array of type T.

Matrix:

Matrix library extends Vector, BasicMatrix and MatrixToVector. With it being a sup class of Vector it allowed us to have the matrix as a 1-dimensional array of vectors which in turn acts as a 2D array of type T. By having Matrix extend Vector it made the arithmetic operations much simpler since the matrix is an array of vectors we only had to enumerate over the array and perform the operation between the two vectors or the vector and T value which is then handled by the Vector class.

TestMatrixVector:

As the specification was fairly open to interpretation we decided to perform the different operations, and store the output which we then compared to expected target outputs. We did this on a basic data type initially and after which decided that tests for the Fraction and Complex classes should also be done. Two more methods were then added in at the end which tests all the arithmetic operations using both Fraction and Complex objects. This approach ended up being rather messy and if we had more time we were looking into doing it in some way where it uses generics to run the same tests with just changing their data types making it a lot more concise and organized however due to time constraints we decided to leave it as is.

testVectorCopy()

Copy the vector

testMatrixCopy()

Copy the matrix

testMatrixTranspose()

Transpose the matrix

testMatrixAddition()

Perform matrix addition

testMatrixSubtraction()

Perform matrix subtraction

testMatrixMultiplication()

Perform matrix multiplication

testMatrixScalarAddition()

Perform matrix scalar addition

testMatrixScalarSubtraction()

Perform matrix scalar subtraction

testMatrixScalarDivision()

Perform matrix scalar division

testMatrixScalarMultiplication()

Perform matrix scalar multiplication

testVectorAddition()

Perform vector addition

testVectorSubtraction()

Perform vector subtraction

testVectorMultiplication()

Perform vector multiplication

testVectorScalarAddition()

Perform vector scalar addition

testVectorScalarSubtraction()

Perform vector scalar subtraction

testVectorScalarDivision()

Perform vector scalar division

testVectorScalarMultiplication()

Perform vector scalar multiplication

testVectorview()

Convert single row multiple column matrix or single column multiple row into vector

testRow()

Return row

testColumn()

Return column

testColumnToMatrix()

Convert column to matrix

testMatrixView()

Convert vector to matrix

testFraction()

Test fraction variant of methods

testComplex()

Test Complex variant of methods

testAll()

Test all functions

Main:

Calls the testAll() function in testMatrixVector, which in turn calls all test functions.