

# EGRE 246 Advanced Engineering Programming Using C++

## Homework #5 – C++ Classes

This homework must be your own (individual) work as defined in the course syllabus and discussed in class.

- 1) Implement a Matrix C++ class for 2-by-2 matrices. The matrix elements should be private doubles and the class should include a default constructor that initializes the matrix entries to 0.0, a copy constructor, and a constructor that takes the matrix elements as a list of entries.

The class should include public methods that include an `inverse()` function that inverts the matrix, a `det()` function that returns the determinant of the matrix, an `isSingular()` function that returns a bool that is *true* if the determinant is zero – *false* otherwise, an `assign()` function that allows new entries to be written into the matrix, and a `print()` function that prints the entries of the matrix.

A main program to test your implementation of the Matrix class is provided in the `hw5.cpp` file. You must define the Matrix class in a header file called `hw5.h` and implement the Matrix class methods in a separate `.cpp` file. You must make your Matrix class implementation comply with the interface used in the `hw5.cpp` file and **you are not permitted to change the `hw5.cpp` file in any way**. When you run the main program in the `hw5.cpp` file, the output must look like that shown below:

```
x matrix is:
  ---
  |          0.0000  0.0000  |
  |          0.0000  0.0000  |
  ---
|x| = 0.0000
x is a singlar matrix

y matrix is:
  ---
  |          1.000  2.000  |
  |          3.000  4.000  |
  ---
|y| = -2.000
y is not a singlar matrix

z matrix is:
  ---
  |          1.000  2.000  |
  |          3.000  4.000  |
  ---
```

```
|z| = -2.000
z is not a singular matrix
```

z matrix inverse is:

-2.000	1.000
1.500	-0.5000

x matrix is:

0.0000	1.000
0.0000	1.000

x matrix inverse is:

```
Error: matrix is singular - it does not have an inverse
```

0.0000	1.000
0.0000	1.000

y matrix is:

4.000	3.000
3.000	2.000

y matrix inverse is:

	-2.000	3.000
	3.000	-4.000

For this homework, submit a zip file with your class definition in hw5.h, your class implementation in a separate .cpp file, and the original hw5.cpp file. Be sure to include a Makefile that compiles your solution.