HW0 Writeup

Problem 2

Four tests were implemented.

Test 1 tests whether the matrix object initialization and element accessing operations are correctly implemented. It is expected that all entries will be initialized to zero values when a triangular matrix object is instantiated.

Test 2 tests whether modification operation of entries are correctly implemented. The lower diagonal entries are modified after the matrix object is instantiated. It is then checked whether the correct values are stored by accessing and checking the entries one by one again.

Test 3 tests whether the method to compute l_0 norm is correctly implemented. A lower diagonal matrix object is first instantiated. Then the l_0 norm is computed which should have the expected value of zero. After that, two elements of the matrix are modified to non-zero values. The l_0 norm is computed again which should have the value of two this time.

Test 4 tests whether the three error exceptions are thrown correctly. They are respectively exceptions thrown when the matrix is instantiated to have zero size, elements not in the matrix are requested, and elements above the diagonal of the matrix are requested.

The code passed all the tests.

Problem 3

In this problem, smart pointer can be used to help append different kinds of matrices to the same std::vector. If smart pointers are not used, derived part of object may be lost due to casting operation performed to put the object into the container. Besides, smart pointers can also help manage the memory allocated for objects. When the object is no longer referenced, it will automatically delete the object.

Problem 4

There are 19 points in the range [lb, ub] = [2, 10] out of 1000 points.