Computer Science Homework 4

# Question 2:

The insert member function in the Multiset class calls the find function (which is defined as a private member function in the Multiset class). The find function compares the values of a particular data type using the != operator. However, the program does not know how to compare two data values of type ‘URL’ as the user has not defined a method to do so. Hence, this results in a compilation error.

# Question 3.b.

A string variable is needed (as a second parameter) so that the names of the submenus can be concatenated and passed in as a parameter for the recursive function. If this second parameter was not present, the recursive function will not be able to remember/store the names of the previous submenus.

# Question 4.a.

There are 3 loops nested within each other, and each loop is run N times. So the no. of lines this program runs is approximately p + N(a + N(b + N(c)) ) where p, a, b, c are arbitrary whole numbers representing no. of single statements. However the highest order is N3 and hence the time complexity of the algorithm is

**O(N3)**

# Question 4.b.

This time the second loop does not run N times, however the maximum no. of times it can run is N-1 times. The first and second loops run N times. Although this algorithm will take lesser time than the one in 4.a, the time complexity of this algorithm is also

**O(N3)**

# Question 5.a.

The for loop runs N times and statements within the loop are executed N times at most (such as the call to the ‘contains’ method). Hence the time complexity of this algorithm is

**O(N2)**

# Question 5.b.

The sort has a time complexity of O(N log N), while all other loops and statements run N times at most. So, if around p(N) + (N log N) lines are run during execution (where p is an arbitrary whole number), the algorithm will have a time complexity of

**O(N log N)**