CS32 Homework 4

Siddarth Chalasani

# Question 2

There is an error because the insert function calls the findFirstAtLeast function, which walks through the linked list and compares the values associated with the pointers using the ‘<’ operator. However, since that operator has not been defined for the Coord class, so the compiler doesn’t know how to execute that operation.

# Question 3b

This problem could not be solved with recursion using the one-parameter listAll because there would’ve been no way to keep track of the full path name of the MenuItem within the recursive calls to listAll.

# Question 4a

The time complexity is O(N3). This is because there are three nested for loops, each of which, in the worst-case scenario, executes N times.

# Question 4b

The time complexity is O(N3). The new algorithm does improve the efficiency of the algorithm, since for every i and j less than N, only one of either numIntermediaries[i][j] or numIntermediaries[j][i] is actually computed, and the other is just set equal to its value because of symmetry of communication. However, since this only eliminates the need to compute one out of every two pairs of people, the efficiency is improved by 50%, and since time complexity doesn’t care about coefficients, the time complexity of the new algorithm stays the same at O(N3).

# Question 5a

The worst-case time complexity is O(N2). This is because, by the time the function gets to the for loop, no matter what sp is, it has a size of N, so the for loop will run N times. Since get has a time complexity of O(N) and and insert has a time complexity of O(1), the time complexity of one iteration of the for loop is O(N). Therefore, the worst-case time complexity is O(N2).

# Question 5b

The time complexity is O(N logN). This is because the time complexity of the for loop and copying elements into v is O(N), and that of the sort is O(N logN), so the overall time complexity is O(N logN).

# Question 5c

The time complexity is O(N). This is the time complexity for each of the for loops is O(N), so the overall time complexity is O(N).