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CS 32 Lecture 1

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Homework 4

2. The reason the insert function does not work with the Coord class is because the function uses the ‘==’ operator. Since ‘Coord’ is a user defined class, it must also have a custom ‘==’ operator to be able to use set’s insert function.

3b. You could not implement the List all function recursively with only one parameter because there would not be a way to access the menu path that the current menu exists in. The scope of the function has no knowledge of the previous scopes. With two parameters, you can recursively call a new function with a new menu path.

4a. The big-O is O(N^3) because there is a nested loop inside of a nested loop inside of a loop. The most frequent operation is going to run N^3 times.

4b. Changing the condition in the second for loop to j < i does not change anything because i will eventually reach N-1. Therefore, the most frequent occurring function will still run N\*N\*(N-1) times, so Big-O is O(N^3).

5a. The big-O is O(N^2) because in the worst case the for loop will run N-times, and the insert operation calls findFirstAtLeast() which runs N times itself. So N\*N = N^2.

5b. Big-O is O(NlogN). Vector’s push back is an O(1) operation, so the total operations for the first 2 for loops is N + N. The sort is N log N. doErase is O(4) and its for loop runs N times. The last for loop runs 2N times because of the combined size of both sets, and insertBefore is O(7). Therefore the total number of operations is NlogN + 2N + 14N + 4N, so Big-O is O(NlogN).

5c. Big-O is O(N). The while loop will run around N times and all the nested function are constants, so the while loop is O(N). The for loop will also run N times and its nested functions are also constants. Therefore, the Big-O is O(N).