**Chelsea Biala**

**CS32 Lecture 2 Smallberg**

2. The single-parameter version of the insert method uses the binary operator greater than to determine the position at which the element is to be inserted. This does not compile because nowhere in the Coord class is there any way to determine whether one Coord is “greater” than another.

4b. Since the function listAll has a return type of void, there would be no way to recursively keep track of all the previous files in the Directory and print them out without the string path. This second parameter allows us to add on the names of subsequent files in the Directory recursively and print them all out together.

5a. O(N^3) This is because there are 3 nested for loops that iterate N times. Since they are embedded within each other, the operations within will execute N\*N\*N times, making the time complexity O(N^3).

5b. O(N^3) Although this algorithm is slightly more efficient, it is only so because the innermost loop only executes i times instead of N. In the worst case scenario, the loop will still execute N times, so this difference is negligible. In the average case, this loop executes N/2 times, meaning the time complexity is N\*N\*(N/2). This is still O(N^3) even if the constant proportionality is better for this algorithm.

6a. O(N^2) The first loop iterates N times (technically the number of the smallest size of the two arrays, both of which are given as N) and visits elements in each sequence once (2N visits). Within this loop, the insert() function is called, which has an average time complexity of N because it must traverse elements in the Sequence to find the best spot to insert. This loop, therefore, is O(N^2). The second loop will not execute since the two sequences are the same size, giving us an overall time complexity of O(N^2).

6b. O(N) The first for loop also executes N times, as the size of both sequences is still N (2N visits). This time, the insert function has a specific parameter telling the program where to insert the new node, so the time complexity for this loop is just O(N). For the better than the previous algorithm because it is able to keep track of a memory location at which to insert the new node without having to find it again each time.