Alissa Niewiadomski

704794074

CS 32

**Homework 4**

2. The problem with the call to Map<Coord, int>::insert is that Coord does not have the operator< function defined for it. Map::insert calls Map’s private function find, which makes a comparison between the key passed to it and each key in the map

(p->m\_key != key). Since there is no operator< function for Coord, there is no way for two Coords to be compared. Thus, the compiler gives errors.

3b. In the implementation of the two parameter listAll, the base case is that there are no more subclasses to visit, and all the printing requirements are handled by a single line of code: std::cout << path << std::endl. Without passing in the path into the function, there is no way to “build” each function call’s path recursively. In addition, we must pass in a pointer to each class/subclass with each call to be able to access the class’s name. Therefore, there must be two parameters: one to build the path (by passing in path), and one to indicate which subclass to add on.

4a. The time complexity of the algorithm is O(N3). There are two inner loops within the main loop, and the code of the innermost loop is executed N3 times.

4b. The time complexity of the modified algorithm is still O(N3). In the worst case, the second loop will run N2 times (j < i; I can be at most N – 1 🡪 round this to N), which means the innermost loop will still be run N3 times.

5. The time complexity of this algorithm is O(N2). The main loop runs N times, and within the loop there are at most 6N function calls/assignments/comparisons. The rest of the operations outside of the loop are trivial, and the time complexity is N\*(6N) => O(N2), ignoring coefficients.