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Homework 4

2. The line “mpi.insert(Coord(40,10), 32);” causes compiler error c2676 because within class Coord, because the class does not define the != operator. In the map function insert, the program compares the parameter Coord with all other Coords in the map, but the != operator is not defined, resulting in a compiler error.

3b. The problem could not have been solved with recursion using only a one-parameter listAll function because it would not have printed the first base class otherwise. The recursion works by incrementing the iterator and running itself at every subclass, meaning it will print all subclasses properly except for the initial one.

4a. The time complexity of this function is cubic time, O(n3). This is because The functions greatest iteration amount lies in the nested for loops. For each loop that is run, the power of the time complexity increases. These loops do run less because of the continue statements, but the greatest power is cubic still.

4b. The time complexity of this function is still cubic time, O(n3). It remains the same because despite the decrease in the number of iterations at the second for loop, the process still runs (n2 – n)/2 times, and the third for loop would then run O(n3) times, which still results in the big O to be cubic.

5. All statements before the copy constructor can be considered constants.

The copy constructor contains only one non-constant traversal through the list, meaning that the Big O is N. The for loop after runs a number of N times, thus every statement inside it runs a number of N times.

The function get(n, k, vsmall); splits the number of elements in half, giving it a value of N/2 which is just N. This is run N times, meaning that its number of iterations is N2.

The functions get(k, vbig), insert(k, vsmall), erase(k) use the linear search function find(key); meaning they have a value of N, and it is run N times, meaning their number of iterations is N2.

The remaining statements are constant.

Therefore, the big O of this function is O(N2).