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Homework 4

2. The code for insert causes an error because “insert” calls “doInsertOrUpdate” which then calls “find” which uses the “!=” operator to compare the local variable p’s key and the parameter key. Since the “!=” operator for the Coord class is not defined, it is unable to properly perform the comparison, therefore causing an error.

3b. We could not solve this with only the single parameter listAll() function because the recursive call needs the path parameter. In my implementation, I made the listAll() function with two parameters to first print out the path then the name of the Class. Then I used a for loop to go through the size of m\_subClasses number of times to call the two parameter listAll() function recursively with the new “Class” pointer being the “i”th subclass of the current Class and the new “path” becoming the previously printed string + the “=>” symbol.

4a. The time complexity of this algorithm is O(N^3). This is because there are three for loops of time O(N) with each for loop being embedded within the previous one. Therefore, to calculate the total time complexity we get O(N\*N\*N) which results in O(N^3).

4b. The time complexity of this algorithm is O(N^3). Even though the change was made to reflect the symmetry, it was said in lecture that the Big O of a function that takes the counter variable of the previous for loop as the limit of the nested for loop gets an average of N(N-1)/2 permutations which remains at O(N^2). After including the nested O(N) for loop that’s inside the O(N^2) for loops, the total Big O becomes O(N^3) again.

5. The time complexity of this function is O(N^2). First the res initialization is O(N) but because it’s not embedded in anything it just adds an order N. The for loop is also O(N), but within the for loop there are O(N) functions embedded within it. Therefore, the executing the entire for loop becomes O(N^2). After adding everything else, the O(N^2) of the for loop is the greatest one so the entire function’s time complexity is O(N^2).