CS 32 Homework 4

1. The call to Map<Coord, int>::insert() causes an error because insert() calls Map<Coord, int>::doInsertOrUpdate(), which then calls the function Map<Coord, int>::find(). The function find() tries to compare two KeyType values using the != operator but such an operator has not been defined to compare two Coords, which causes a compile error.
2. (b) In order to implement listAll() recursively, we need to pass the function the pointer to the class and a string path in order to keep track of classes/subclasses so far. However, the return type of this function is restrained to void so we cannot use return to record strings. Therefore, we must pass the string path by a parameter, which is why we cannot solve the problem using only one-parameter listAll().
3. (a) The time complexity is O(N3) since there are three nested loops that run from 0 to N.

(b) The time complexity is still O(N3) because there are still three nested loops. The inner and outer loops each run from 0 to N, and the middle loop is called from 0 to the outer loop limit, which is still N/2 in average. Since coefficients and constants are unimportant to big-O, the time complexity is still O(N3).

1. The time complexity is O(N2) because there is one for loop that iterates from 0 to N and several functions within (get, insert, erase) that are also looped N times. However, since these functions are not embedded into each other, the big-O is then N\*(N+N+…) depending on the parameters:

size comparison; <========================== O(1)

for (int n = 0; n < smaller->size(); n++) <========== O(N2)

get(3-parameter); <==================== O(N)

if (get(2-parameter)) <================== O(N)

insert(); <====================== O(N), calls find(); <== O(N)

else if (value comparison) <============== O(1)

erase(); <====================== O(N), calls find(); <== O(N)

swap(); <================================= O(1)