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CS 32 - Homework 4

2. The insert() function defined in Set.h implicitly relies on the comparison operator, because it calls the findFirstAtLeast() function to determine where to insert the new node. The standard comparison operator has no way of comparing two coords, because they are not primitive types like ints or chars. As such, the comparison operator must be overloaded for the coord class, in order for functions like insert() or erase() to work.

3(a). This function performs **O(n^3)** operations, because it has 3 nested loops.

3(b). The time complexity of this algorithm is still **O(n^3)**, because even though the second loop runs a total of n-1 times, we can approximate it to be n times. (Proof: n\*(n-1)\*n = n^3)

4(a). The worst case time complexity of this algorithm would be **O(n^2)**. Because the loop would run N times and each Get() and Insert() which would each run N times. So (N^2 + N^2 = 2N^2) which simplifies to N^2.

4(b). The time complexity of this algorithm is **O(n^2)**. This is because of the for loop with the insertBefore() function, the for loop itself has a cost of N, but inserting before the first element of a vector costs N operations per loop. Hence, we get N\*N giving us N^2.

4(c) The time complexity of this algorithm is **O(n^2)**. We can assume that in a worst case scenario the while loop will run N times, and that the insert function will need N operations per loop.