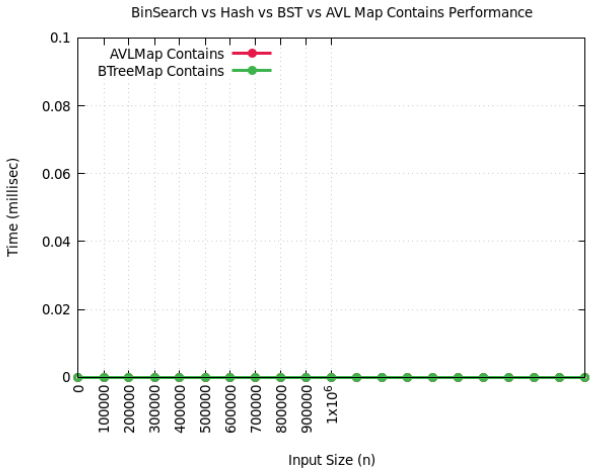
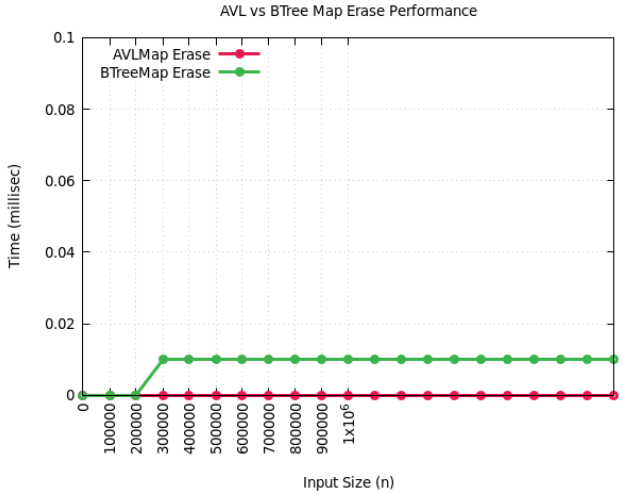
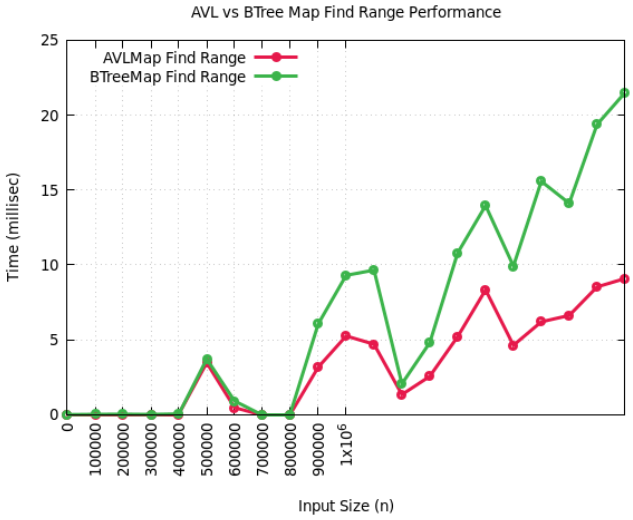
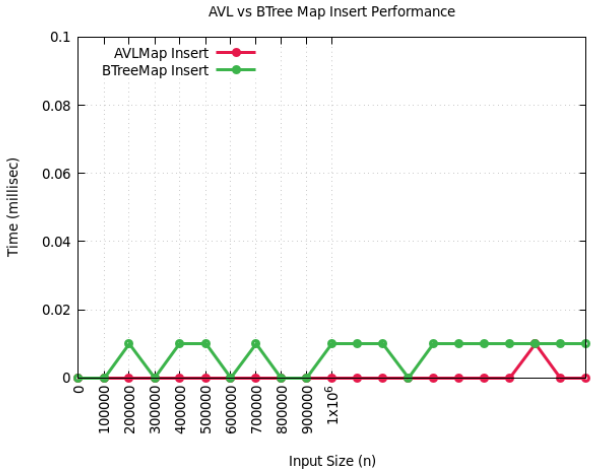
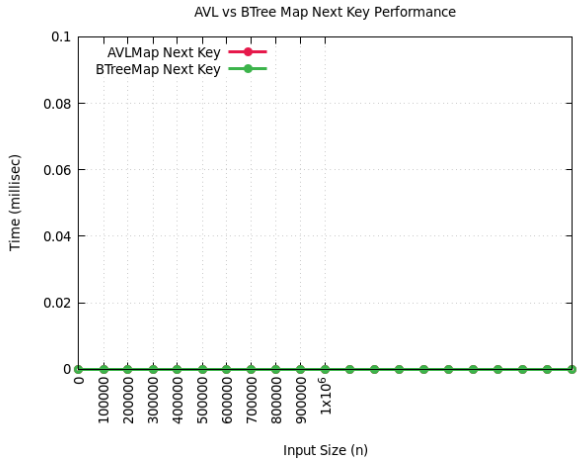
Samuel Sovi
CPSC 223
HW-10

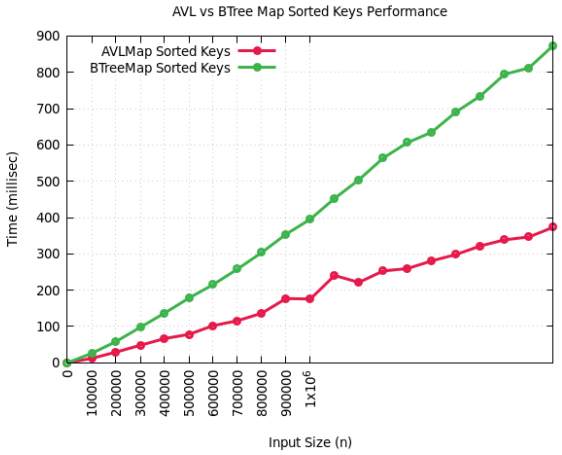


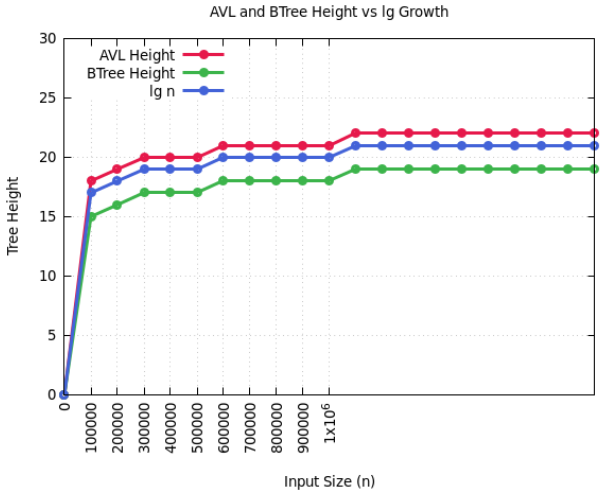












Above are my graphs comparing the similarities and differences between the speeds of my implementation of an AVLTree and those of my implementation of a BTree. In the first graph, we can see the very comparable speeds of contains in both data structures since both trees take O(log n) time to find if an element is contained within the tree. In the second graph, we can see that my BTreeMap is slightly slower than my AVLTreeMap possibly due to the increase in cases that need to be handled in a single rotation as well as the need to check multiple elements in a single node. Both erases are still O(log n). For both find range methods, both TreeMaps require themselves to access every node in the tree once in their worst case which makes both of them O(n). With insert, there needs to be more checks on attributes such as the size of a node in order to perform a rotation or split. Regardless, both TreeMaps take O(log n) time to insert. For finding the next key, both trees must just get to the key prior plus one extra key in the worst case. As such, both TreeMaps' find_keys() functions are O(log n). For sorted keys, both TreeMaps must obtain all the keys and then return them since all the keys can be retrieved in sorted order. Finally, BTrees have a smaller height compared to AVLTrees since BTrees can hold up to 3 keys per node in this case and can have more than 2 children.

In this assignment, I ended up using the classic print to debug method of fixing all the issues I created with my code. In many places, I later found myself deleting elements that should not be deleted or even shifting the wrong elements when performing rotations. Memory leaks were also a struggle for me to get rid of and I felt very good when I finally removed them all. Time was also not on my side since I had so many other projects and Finals all happening at the same time. Overall, this project as well as the class as a whole has been a great stepping stone for me on the path to pursuing a Computer Science related career.