CSE 222
Homework 7
Problem solution approach

In part 1.1 , we would implement NavigableSet using skip-list. But not all methods would be implemented in the NavigableSet interface, so I made my own specialized NavigableSet interface. The hard side of this part is implementing a descending iterator because the nodes are connected singly. So we cant go to backward. Because of that I decided to put elements to a stack when constructing the iterator. Then I pops the elements one by one. If stack is empty then hasNext() is false. The other methods were used with delegation.

In part 1.2 , I made also an interface because of same cause. For the iterator I firstly go into left and left one by one push them to a stack and with every next() we I traverse the right side with same technique and push to the stack. For headSet() I go over until the item and add them one by one to a new NavigableSet. The reverse of the same mechanism is used for also tailSet(). Insertion is made with delegation.

In part 2.1 , I calculate the balance value by calculating the height of right and left side. I made a private method for this operation. I made the isAVL() method recursive which search from leaves to the root.

In part 2.2 , I check the all properties of red-black tree like if the root is black, If the size of the black nodes from to leaves are same or not and if there are any consecutive red nodes. All methods I did here is recursive.

In part 3 , I made a class named Test that takes testable which is a interface to test add functions. I put testable interface keyword to all trees that tested. In test class there is a static method that returns an integer array with given size. The constructor takes the array and the testable to test and also size to repeat the test again. It just adds all the elements in the array to the testable. Then adds 100 extras to it by measuring the duration. It repeats this as given in the constructor. Then we get the result with getAddingTime() method. With this class I made all performance tests of all structures given in the pdf. Then I made a graph for those duration.

That’s all I did for this homework. I tried to do best. I hope there are no any problem.

Mehmet Hüseyin YILDIZ
200104004095