Homework 9 Part B

Due date: Apr 9, 2020, 9:30am

Homework 9 Part A has to be completed on the course website. Homework 9 Part A and B combined account for 50 points, like any other prior homework.

1. (10 points)
   Perform the following operations on an initially empty binary search tree. Draw the tree after ***each*** operation. Before you get started, see also the submission instructions below.

```
(1)  insert("goose")
(2)  insert("horse")
(3)  insert("rooster")
(4)  insert("cat")
(5)  insert("dog")
(6)  insert("cow")
(7)  insert("hen")
(8)  insert("pig")
(9)  delete("cat")
(10) delete("horse")
```

2. (10 points)

   Write Java-like code for the constructor and the method `addAsLeftChildOf`. The constructor and method `addAsLeftChildOf` have to meet the specification in the comments.

```
/**
 * BinaryTree
 *
 * @author CS3151
 * @param <T> type of the node values
 */
public class BinaryTree<T> {
    private BinaryNode root;

    /**
     * Instantiates a new binary tree with three nodes: The root of the new tree has
     * two children where the root has the specified value valueRoot, the left child
     * of root has the specified value valueLeft, and the right child of root has
     * the specified value valueRight.
     *
     * @precondition valueRoot != null && valueLeft != null && valueRight != null
     * @param valueRoot  value of the root
     * @param valueLeft  value of the root's left child
     * @param valueRight value of the root's right child
     */
    public BinaryTree(T valueRoot, T valueLeft, T valueRight) {









    }
```

```
    /**
     * Adds a new node with the specified value as a left child of the specified
     * node. If parentNode has already a left child, then the left child of
     * parentNode becomes the left child of the new node.
     *
     * @precondition node != null && value != null
     * @param value      the value of the new node to be added
     * @param parentNode the parent of the new node
     */
    public void addAsLeftChildOf(T value, BinaryNode parentNode) {









    }

    …

    /**
     * Class BinaryNode
     *
     * @author CS3151
     */
    protected final class BinaryNode {
        private T value;
        private BinaryNode parent;
        private BinaryNode left;
        private BinaryNode right;

        private BinaryNode(T value) {
            this.value = value;
            this.parent = null;
            this.left = null;
            this.right = null;
        }
    }
}
```

Submission

Submit a single pdf file or a single MS Word document with your solutions. No other file formats are accepted. If you prefer to write (or draw) your solution by hand and you do not have a scanner, take a picture of your hand-written solution and imbed the picture in a Word document.