

CMSC132 QUIZ #4 (DURATION: 25 MINUTES)

FIRSTNAME, LASTNAME (PRINT IN UPPERCASE):

STUDENT ID (e.g. 123456789):

There are two problems in this quiz; the second problem is on the reverse side. Implement the methods for this problem based on the following Java class definitions. You may not add any instance variables nor static variables. **If you use any iteration statement (e.g., while loop, do while, for loop) you will get 0 credit for a problem.**

```
public class BinarySearchTreeSoln<K extends Comparable<K>, V> {
    private class Node {
        private K key;
        private V data;
        private Node left, right;
        public Node(K key, V data) { this.key = key; this.data = data;}
    }
    private Node root;
}
```

1. Implement the **RECURSIVE** method **getLeavesData** that adds to the ArrayList parameter the **data** component of leaf nodes of the tree. For this problem you can add data to the ArrayList in any order, a tree with only one node has one leaf, the list parameter will never be null, and you may only add one auxiliary method.

```
public void getLeavesData(ArrayList<V> list) {
```

2. Implement the **RECURSIVE** method **getKeyNodesAtLevel** that returns an ArrayList with the **key** component of nodes found at the level specified by the **targetLevel** parameter. For this problem you can assume the root is at level 1 and the targetLevel parameter will be greater than or equal to 1. You may only add one auxiliary method.

```
public ArrayList<K> getKeyNodesAtLevel(int targetLevel)
```