CSE214 Fall 2022

Recitation 7: More on Binary Trees

1. Fill in the table below for a binary search tree:

Algorithm	Worst Case Complexity	Average Complexity
Search		
Insert		
Delete		

Give an example of a BST for which these worst-case times could occur.

2. Given this node class. Find the **smallest value inside a binary search tree and add it to the largest value.**

```
public class Node {

        int key;
        Node left = null, right = null;
        Node(int key) {
                this.key = key;
        }

}
```

3. Given the root of a binary tree **write an algorithm that prints the inorder of a tree**. (Left Root Right)

Note: The following Node class has been provided for your implementation.

```
public class Node {
        int key;
        Node left = null, right = null;
        Node(int key) {
                this.key = key;
        }
}
```

4. Given the same Node class in Q2, determine if a given binary tree is symmetrical. Note: A symmetric tree is a tree that is symmetrical around its center.

```
public class Node {
    int key;
    Node left = null, right = null;
        Node(int key) {
            this.key = key;
        }
}
```

5a. Draw the binary search tree that is created if the following numbers are inserted in the tree in the given order: [10, 48, 22, 13, 90, 27, 21, 45, 12].

5b. Draw the balanced BST containing the same numbers in part (a)

6. If a node stores data up to 10 bytes and a reference requires 2 bytes, how much space would a full binary tree of height h take up? What about a full binary tree of height 2.

Number of leaf nodes:
Number of internal nodes:

Total number of Nodes:
Number of references:
Space for nodes:
Space for references:
Total Space:

7. True or False

a) Every binary tree is either complete or full

b) Every complete binary tree is also a full binary tree.

c) The maximum number of binary trees that can be formed with 3 nodes is 5

8. Consider a node J in a binary tree with 3 nodes. Given that J has two children, let I be the **preorder successor** of J. Which of the following is true about I?

a) I has no left child

b) I has one right child

c) I has both children

d) all of the above