CSCI 232, Homework 02

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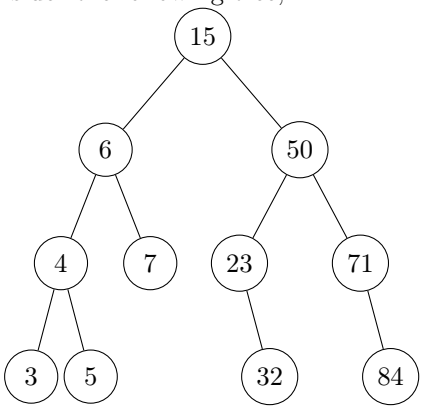
1 Question 1

What are the advantages of using a tree data structure?

Answer : A tree data structure allows you to store information about the relationships between the different nodes and shows hierarchies, it also provide an efficient insertion and searching, the running time can be O(log n).

2 Question 2

Consider the following tree,



What is the in order traversal of this tree?

What is the Preorder traversal of this tree?

What is the Postorder traversal of this tree?

Answer :

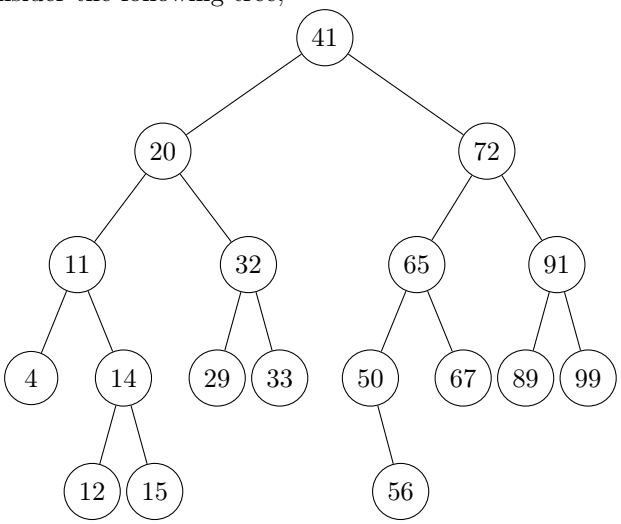
InOrder: 3 ,4 ,5 ,6 ,7 ,15 ,23 ,32 ,50 ,71 ,84

PreOrder: 15, 6, 4, 3, 5, 7, 50, 23, 32, 71, 84

PostOrder: 3, 5, 4, 7, 6, 32, 23, 84, 71, 50, 15

3 Question 3

Consider the following tree,



What is the in order traversal of this tree?

What is the Preorder traversal of this tree?

What is the Postorder traversal of this tree?

Answer :

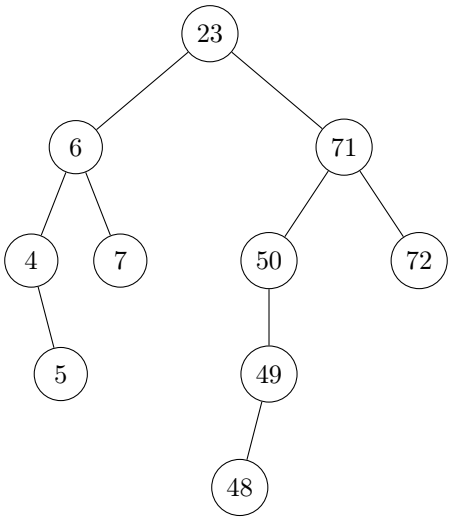
InOrder: 4, 11, 12, 14, 15, 20, 29, 32, 33, 41, 50, 56, 65, 67, 72, 89, 91, 99

PreOrder: 41, 20, 11, 4, 14, 12, 15, 32, 29, 33, 72, 65, 50, 56, 67, 91, 89, 99

PostOrder: 4, 12, 15, 14, 11, 29, 33, 32, 20, 56, 50, 67, 65, 89, 99, 91, 72, 41

4 Question 4

What is the inorder successor to 23 in the following tree?



Answer :

InOrder: 4, 5, 6, 7, 23, 48, 49, 50, 71, 72

InOrder Successor to 23: 48

5 Question 5

Draw the resulting Binary Search Tree after performing the following operations:

INSERT: 23,45,2,4,5,67,52,78,6

Draw the tree at this point.

a. Is this tree balanced?

b. What is the key value of the root?

c. What is the key value of the roots right child?

DELETE: 23,2,67

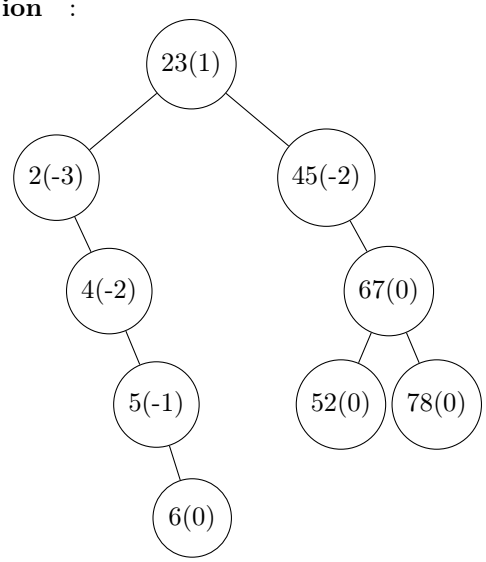
Draw the tree at this point.

d. Is this tree balanced?

e. What is the key value of the root?

f. What is the key value of the roots right child?

solution :



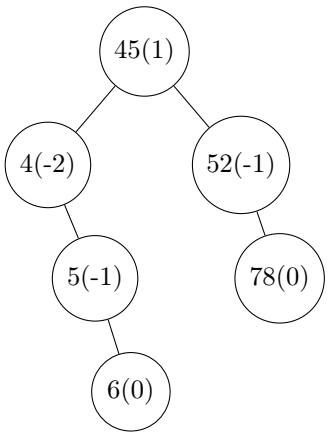
a. This tree is unbalanced because the subtree is unbalanced.

b. The key value of the root is 1.

c. 52(0)Left child + 78(0)Right child = 67(0)

45 doesn't have left child, so the key of the roots right child 45 is -2.

d.



This tree is unbalanced because the subtree is unbalanced.

e. The key value of the root is 1.

f. The key of the roots right child is -1.

6 Question 6

Draw the resulting Binary Search Tree after performing the following operations:

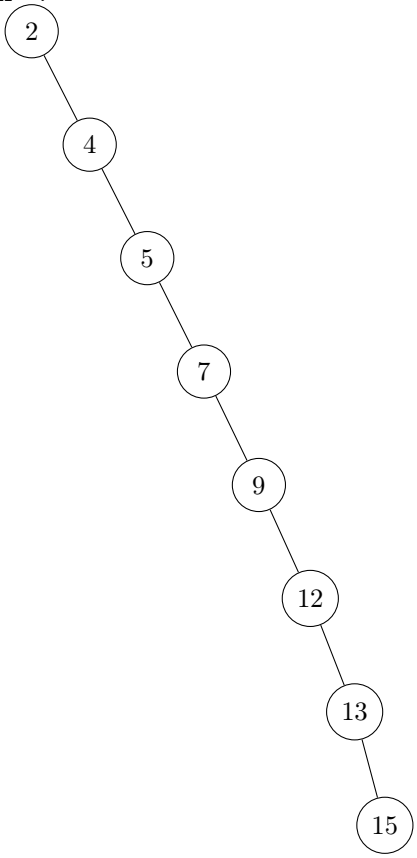
INSERT: 2,4,5,7,9,12,13,15

Draw the tree at this point.

a. What is different about this tree?

b. What is the time complexity of searching for a specific value in this tree?

solution :



This tree has worst case running time for search operation.

The running time for the search function in the tree is O(n).