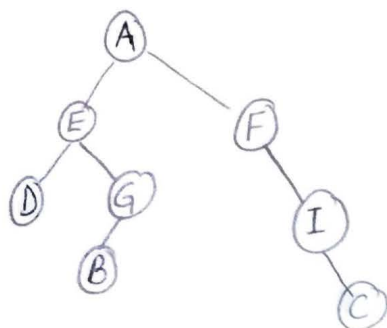Sonam Yangtso

Cpts 233

Homework #2

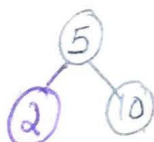1.

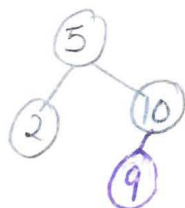② Insert 5   ⑤

Insert 10   (10 > 5), so insert at right

Insert 2   (2 < 5, move to the left

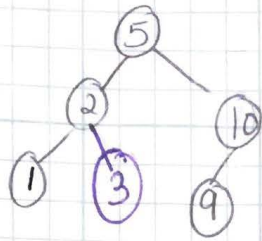Insert 9   (9 > 5, move to the right of 5, 9 < 10, move left of 10

Insert 1   (1 < 5) move to the left of 5, 1 < 2, move left of 2
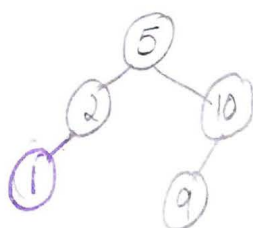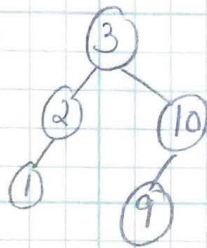
Insert 3   (3 < 5, move left of 5,   3 > 2, move right of 2

Remove 5 from the left subtree. If node to be delete has 2
Children, we replace the node with the largest element of the
left subtree and recursively delet that node.

We are removing 5, the largest element in the left subtree is
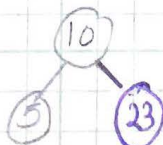3. So replace 5 with 3.

③ Question

Insert 10   (10)

Insert 5   (5 < 10, move 5 to the left of 10)
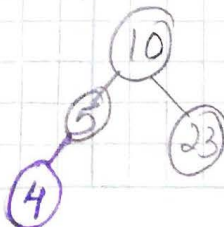

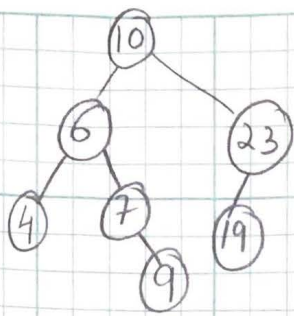Insert 23   (23 > 10, move to the right of 10)

Insert 4   (4 < 10, move to the left of 10, 4 < 5 move to the left
                of 5)

4 Question

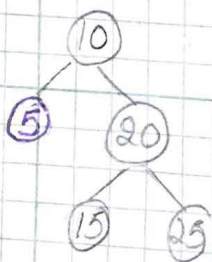A] The height of the tree 4

B] The depth of node 90 is 3

C] The height of node 90 is 1

D] pre-order: 100, 50, 3, 1, 20, 80, 52, 90, 83, 99, 150, 125, 152

In-order 01, 03, 20, 50, 52, 80, 83, 90, 99, 100, 125, 150, 152

post-order 01, 20, 03, 52, 83, 99, 90, 80, 50, 125, 152, 150, 100
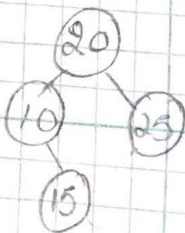
5) Remove 5 from the Given AVL tree

Remove 5
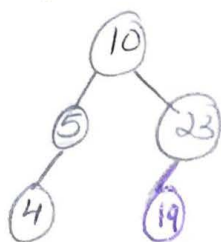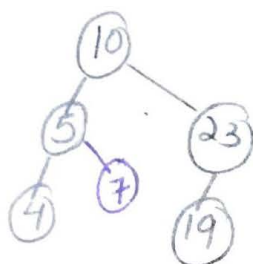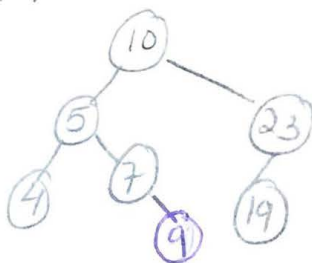
This is RR inbalance

Therefore we do left rotation

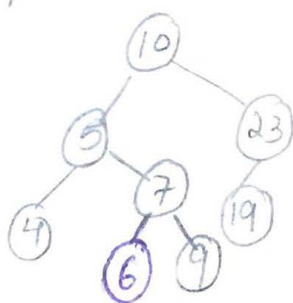Insert 19   19 > 10, move to the right of 10, 19 < 23, move to the left of 23)

```
        (10)
       /    \
     (5)    (23)
     /      /
   (4)   (19)
```

Insert 7   (7 < 10, move left of 10, 7 > 5 move to the right of 5

```
         (10)
        /    \
      (5)    (23)
     /   \    /
   (4)  (7) (19)
```

Insert 9   (9 < 10, move left of 10, 9 > 5 move right of 5, 9 > 7 move
             right of 7

```
          (10)
         /    \
       (5)    (23)
      /   \    /
    (4)  (7) (19)
           \
           (9)
```

Insert 6   (6 < 10, move left of 10, 6 > 5 move right of 5, 6 < 7 move
             left of 7

```
          (10)
         /    \
       (5)    (23)
      /   \    /
    (4)  (7) (19)
         /  \
       (6)  (9)
```
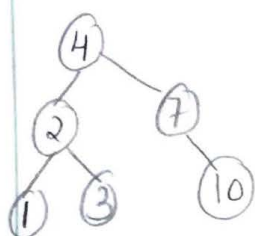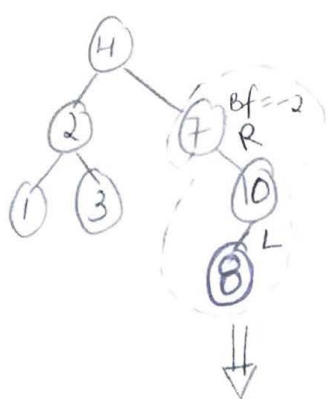
Remove 5   from right subtree of the node

Since 5 has 2 children, we replace the node with the
smallest element from the right subtree which is 6 in this case
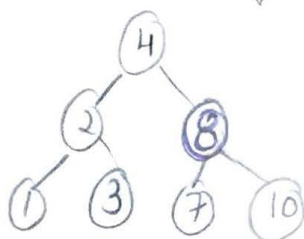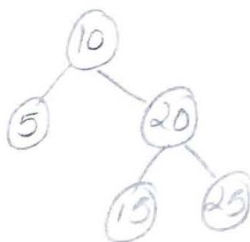
⑥ Insert the value 8 int AVL Tree

This is RL inbalance

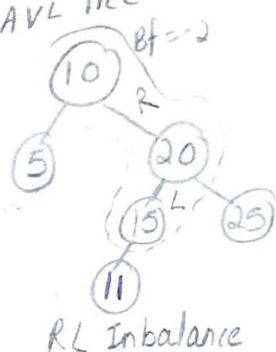⑦ Question
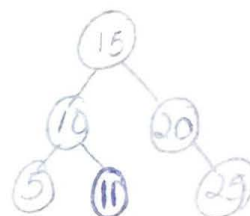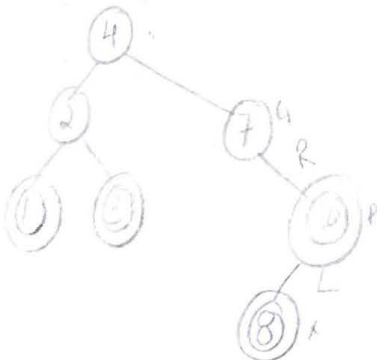
Insert the value 11 in the AVL Tree
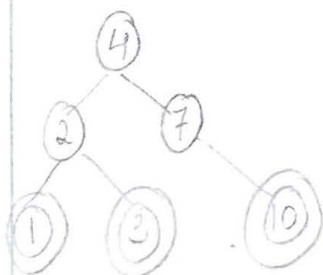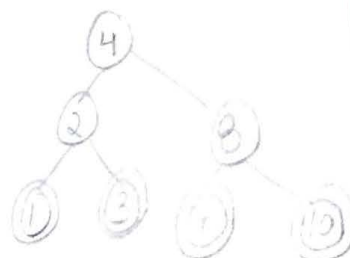

RL Inbalance

⑧ Question

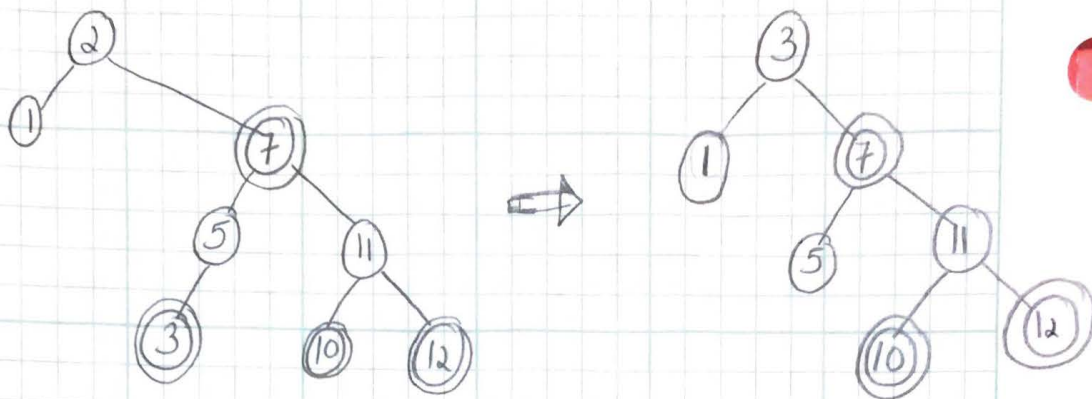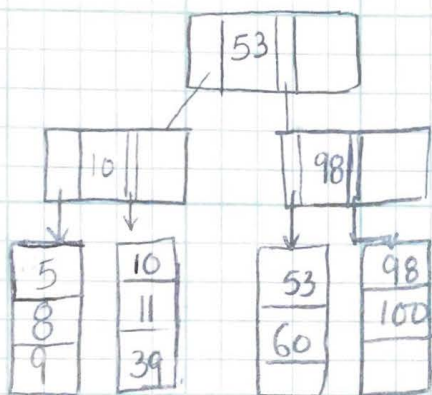Insert value 8 into the Red-Black Tree

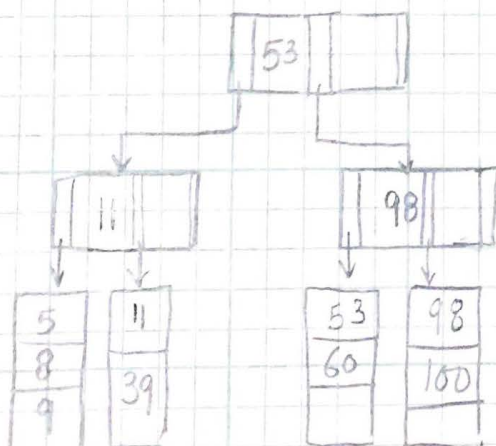9) Delete the value 2 from Red-Black Tree

10)

A) Insert 60 into the Bt tree

B) Deleting 10 from the Bt tree

11)

A) The size of the internal Node (M) is 3 because the given B tree has 3 nodes.
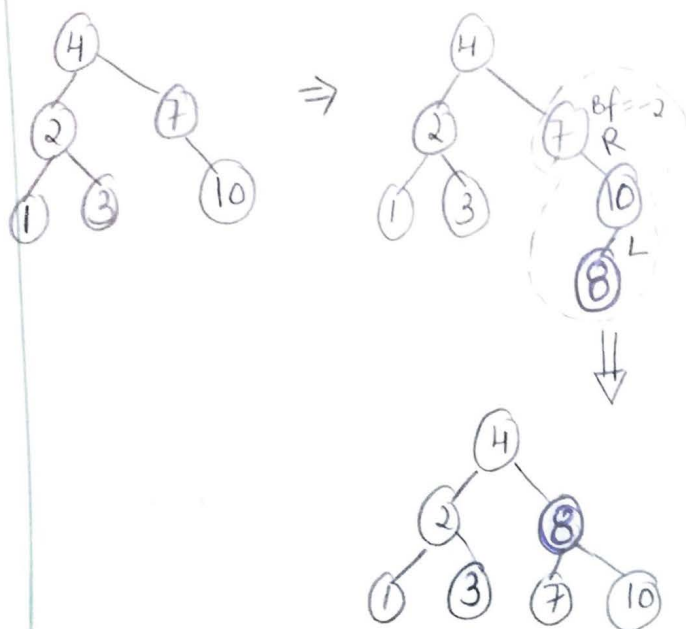
B) Size of B-tree leaf node (L) is 6

C) Since each B+ tree node have 5 pointers....

therefore, $5^m < n \leq 5^{m+1}$, height m

d) If we insert 30,000 Customer records

$= 5^6 < 30,000 \leq 5^7$

Therefore height is 6

e) If we insert 2,500,000 Customer

$= 5^9 < 2,500,000 \leq 5^{10}$

Therefore height is 9

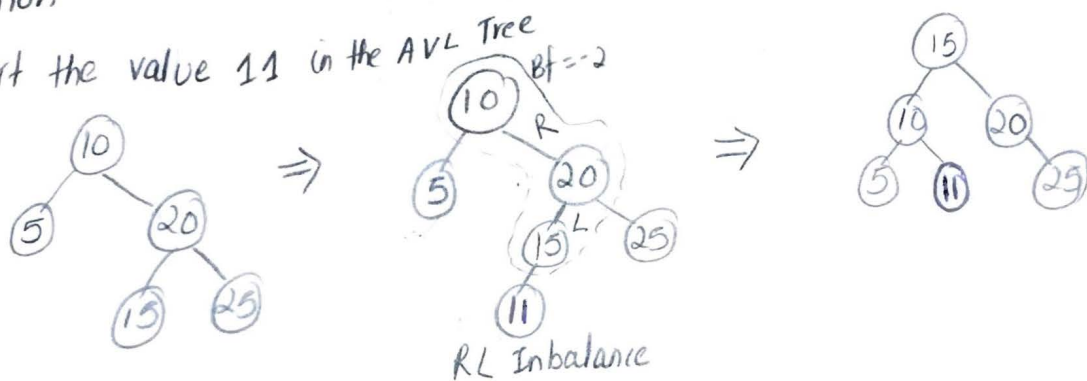Note: Took help from my fellow classmate and tutors.

(6) Insert the value 8 int AVL Tree

This is RL inbalance

(7) Question

Insert the value 11 in the AVL Tree

RL Inbalance

(8) Question

Insert value 8 into the Red-Black Tree