Course: Algorithm

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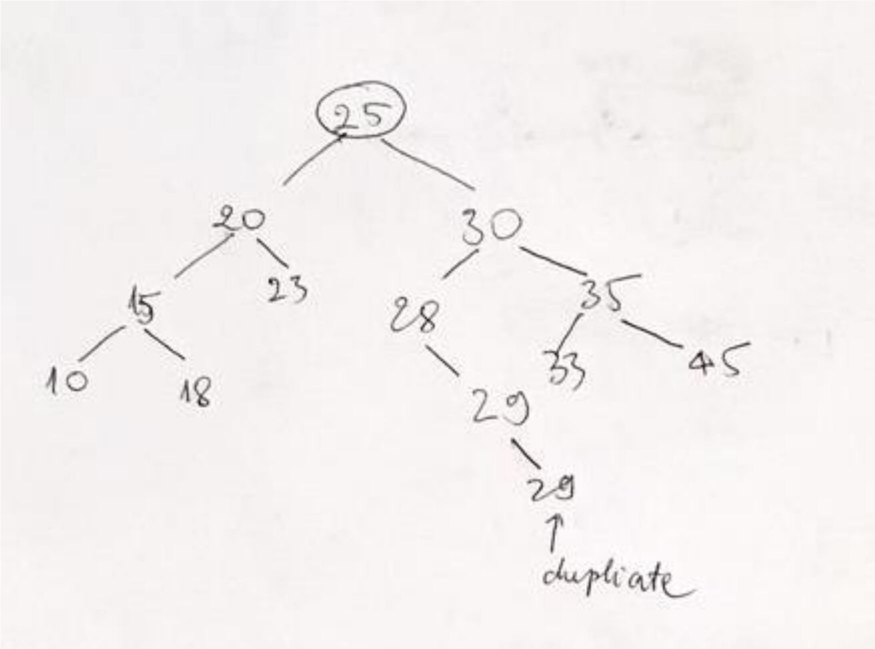
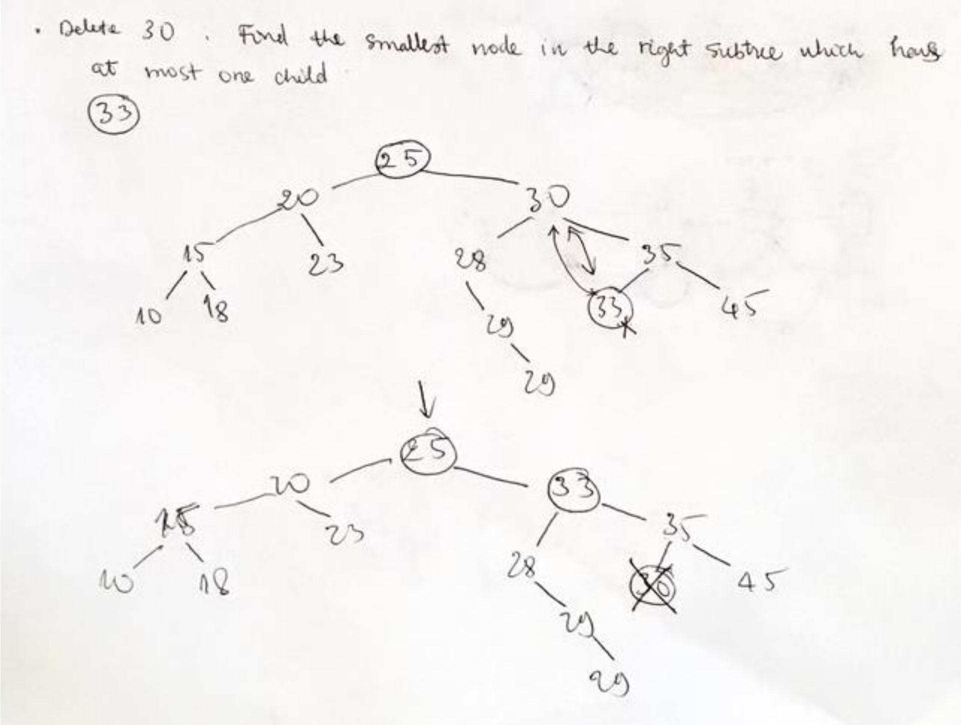
Homework: Lab 9

1. *Build a BST by inserting one element at a time. After each insert, please draw a picture. For this assignment, you can submit hand drawn pictures*
   25, 20, 30, 28, 29, 15, 18, 23, 10, 35, 45, 33, 29

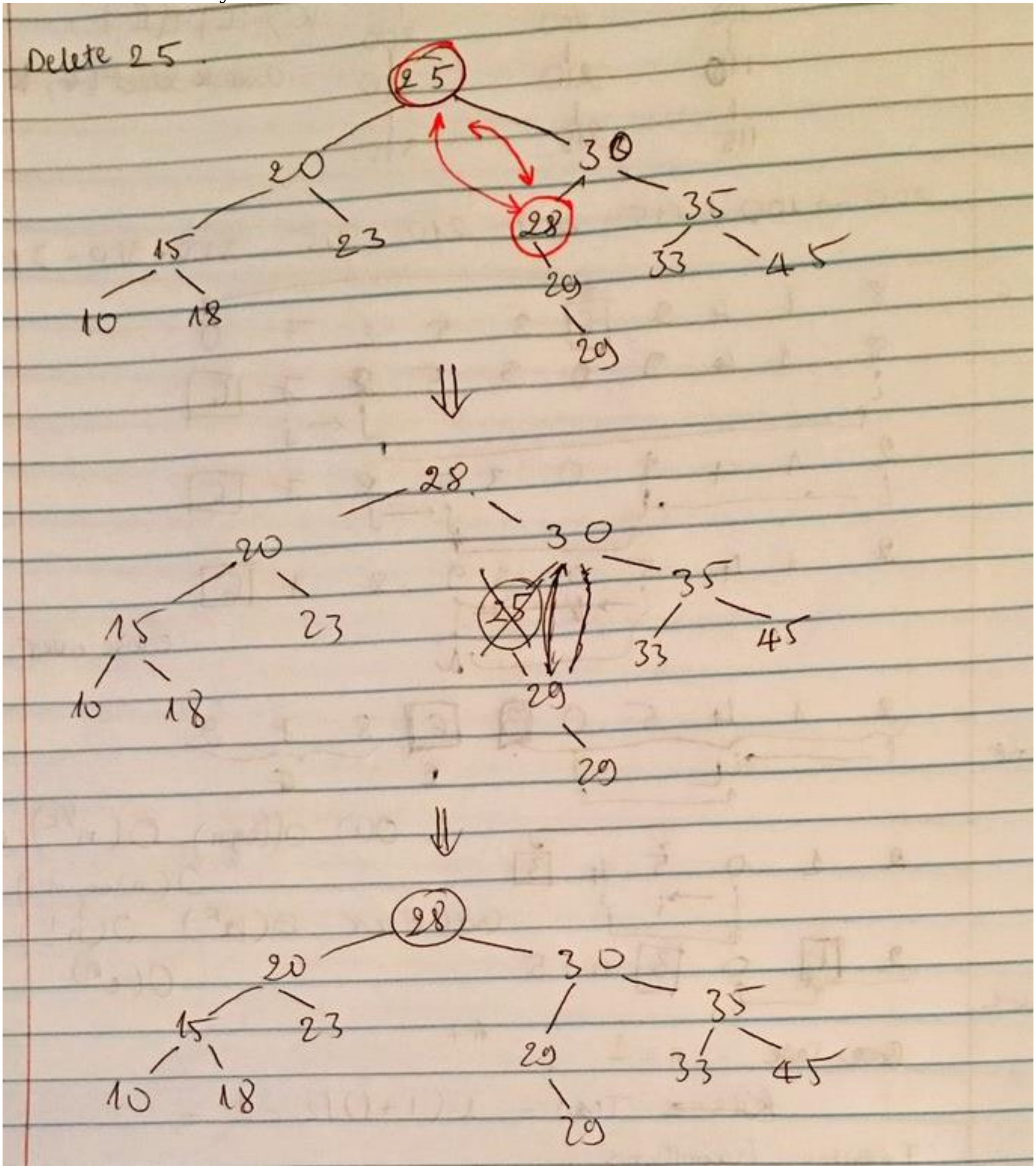


2. *Question 2 – Deletion*

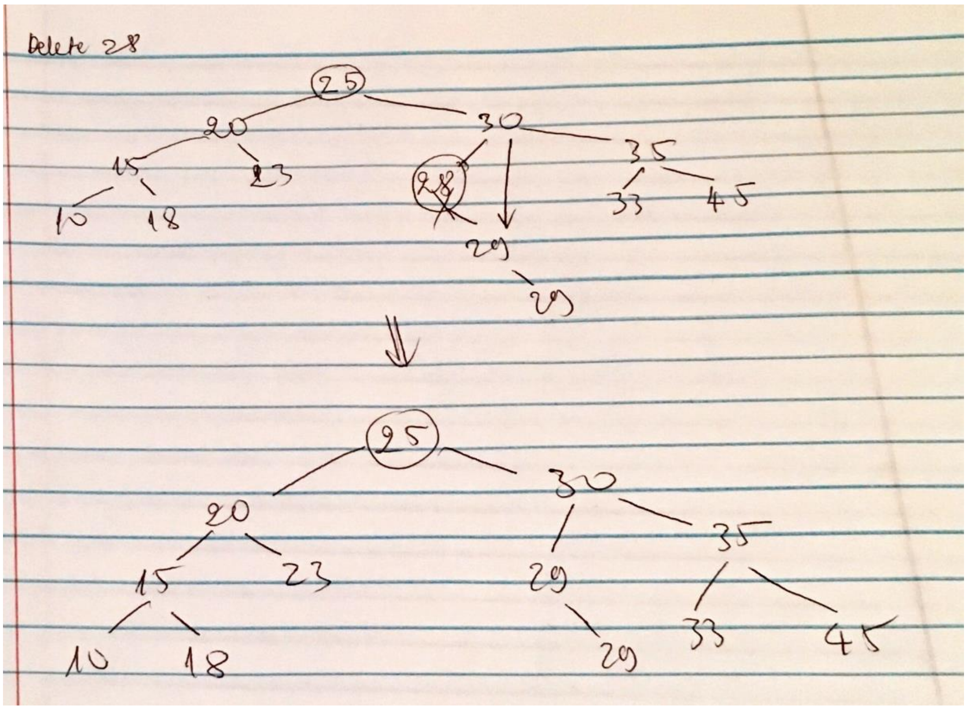
a. Start from the BST you built. Delete 30


• Delete 30 . Find the smallest node in the right subtree which has at most one child

b. Start from the BST you built. Delete 25



c. Start from the BST you built. Delete 28



3. *Question 3 – Traversal*

   a. Start from the BST you built. Preorder traversal

   Root – Left – Right

   25 20 15 10 18 23 30 28 29 29 35 33 45

   b. Start from the BST you built. Post-order traversal

   Left – Right – Root

   10 18 15 23 20 29 29 28 33 45 35 30 25

   c. Start from the BST you built. In-order traversal

   Left – Root – Right

   10 15 18 20 23 25 28 29 29 30 33 35 45

4. *Question 4* - Write a recursive function to

   a. Count the node of the BST

```
Algorithm countNodes(T)
        Input BST T
        Output number of nodes in T
        if T == null do
            return 0
    return 1 + countNodes(T.left) + countNodes(T.right)
```

   b. Count the leaves of BST

```
Algorithm countLeaves(T)
        Input BST T
        Output number of leaves in T
        if T == null then
            return 0
        if T.left == null && T.right == null then
            return 1
        return countNodes(T.left) + countNodes(T.right)
```

c. Create a mirror image of BST

```
Algorithm createMirrorImage(T)
        Input BST T
        Output mirror image of T
        if T != null then
            tmp ← T.left
            T.left = T.right
            T.right = tmp
            createMirrorImage(T.left)
            createMirrorImage(T.right)
        return T
```