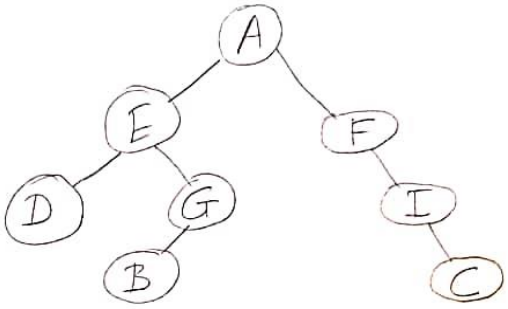
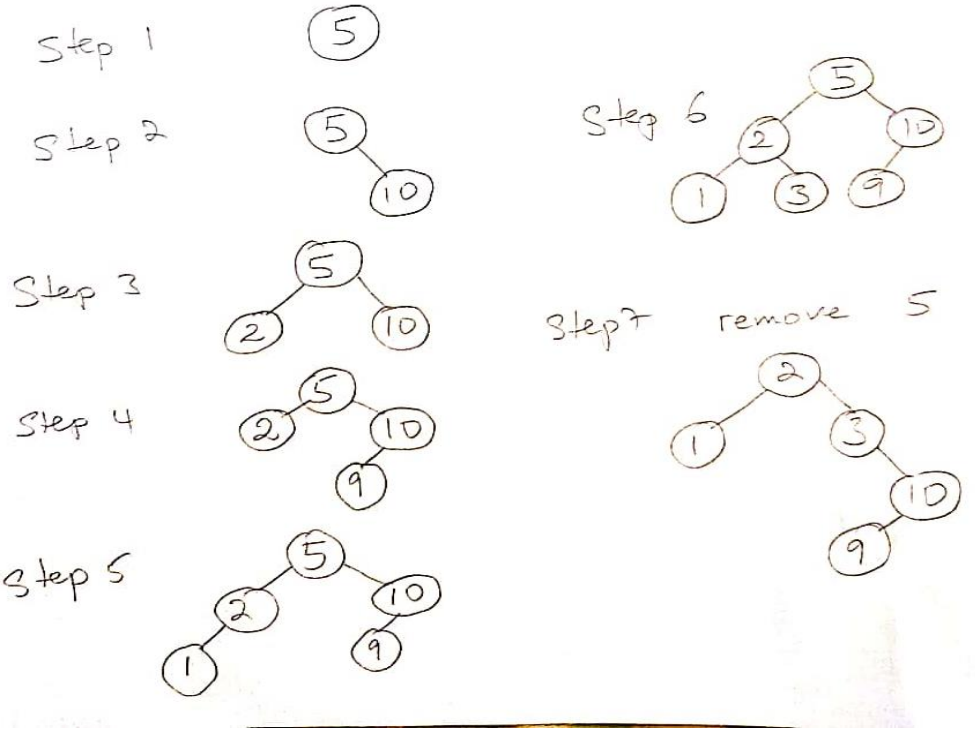
Homework 2

URL: https://github.com/krmesfin42/HW2.git

1.



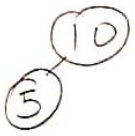
2.



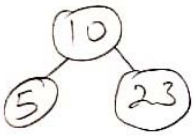
3.

Step 1

Step 2



Step 3



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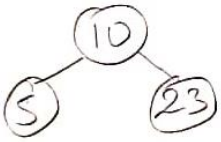
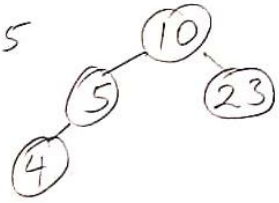
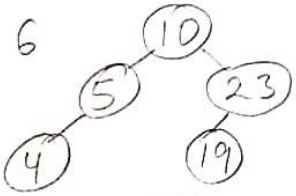


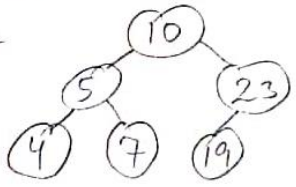
Step 5



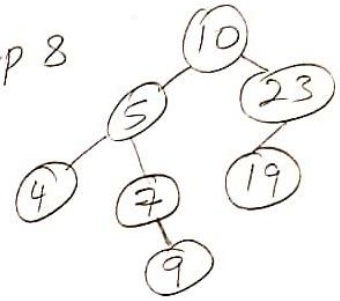
Step 6



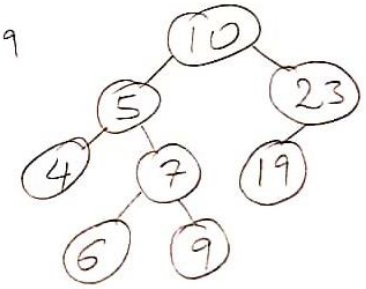
Step7



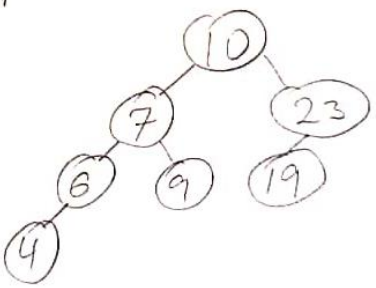
Step 8



Step 9



Step 10 remove 5



4.

A. [1] What is the height of the tree?

4

B. [1] What is the depth of node 90?

3

C. [1] What is the height of node 90?

1

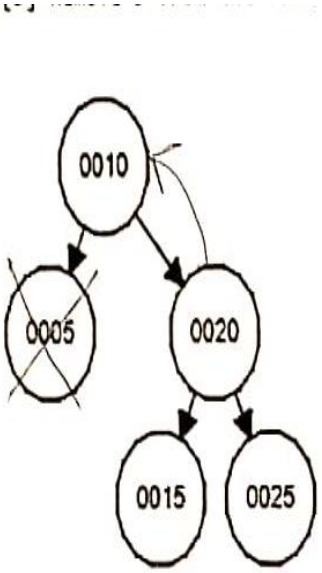
D. [3] Give the pre-order, in-order, and post-order traversal of this tree.

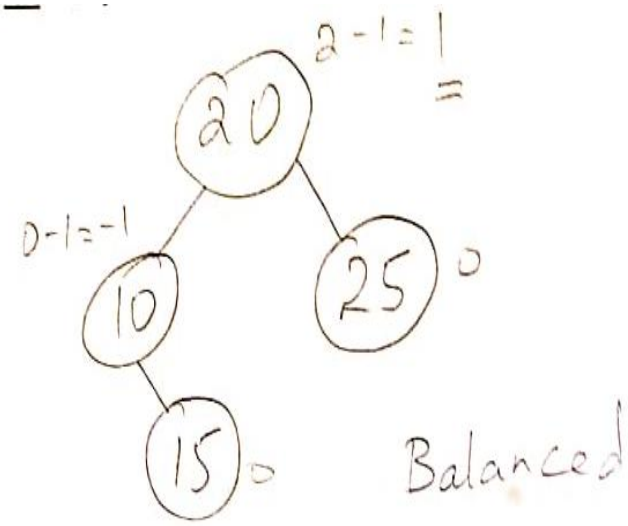
pre-order - 100, 50, 3, 1, 20, 80, 52, 90, 83, 99
150, 125, 152

in-order - 1, 3, 20, 50, 52, 80, 83, 90, 99
100, 125, 150, 152

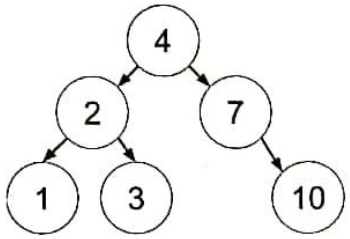
Post-order - 1, 20, 3, 52, 83, 99, 90, 80, 50
125, 152, 150, 100

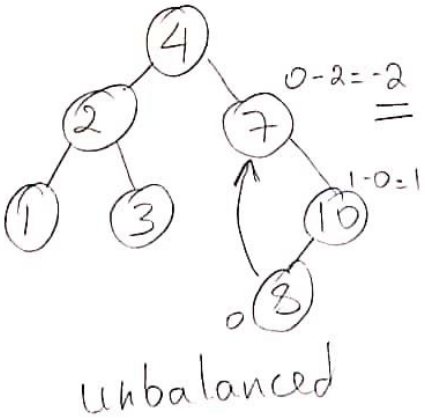
5.

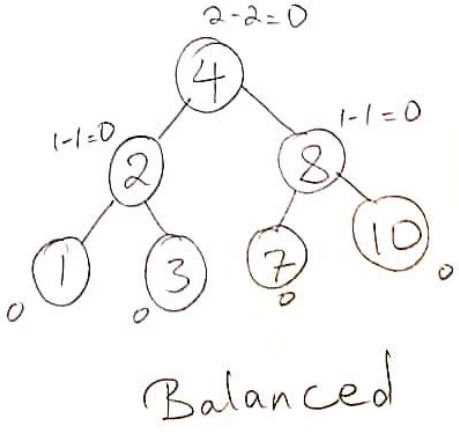

0010
0005
0020
0015
0025


2-1=1
20
0-1=-1
10
25
0
15
0
Balanced

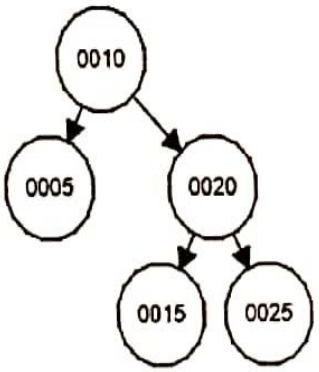
6.

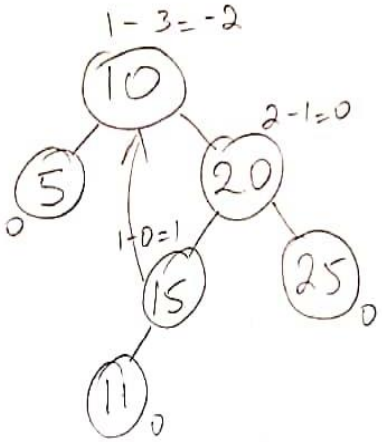

4
2
7
1
3
10


4
2
7
0-2=-2
1
3
10
1-0=1
0
8
Unbalanced

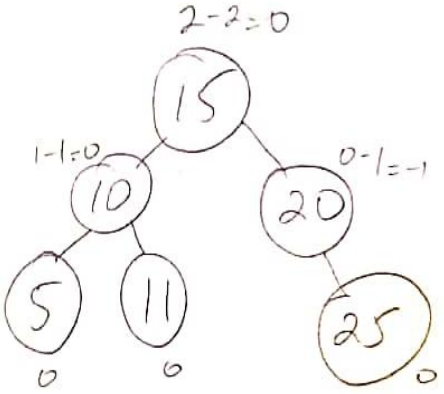

2-2=0
4
1-1=0
1-1=0
2
8
1
3
7
10
0
0
0
0
Balanced

7.



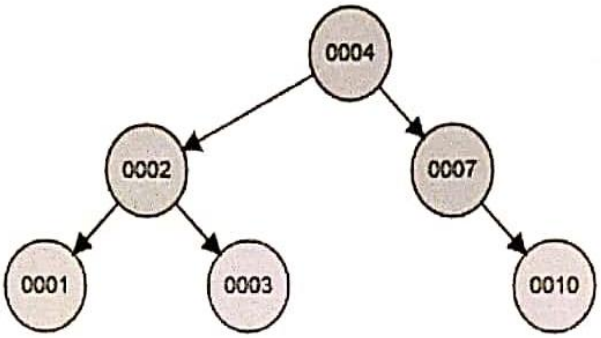


unbalanced

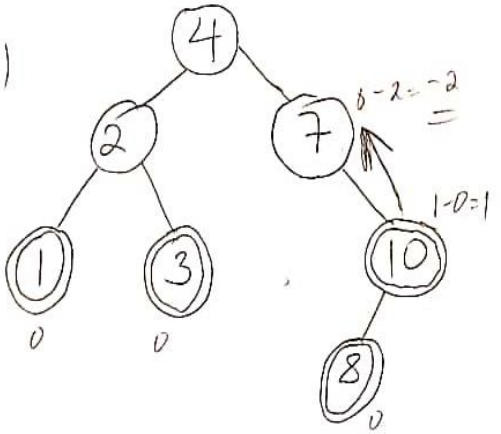


Balanced

8.

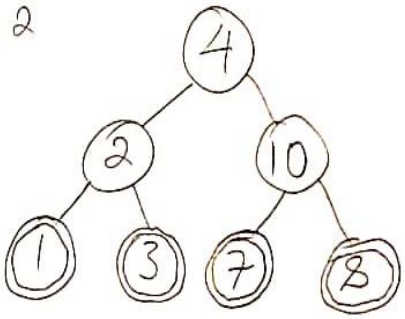


Step 1



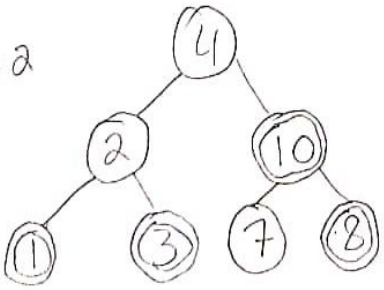
unbalanced

Step 2



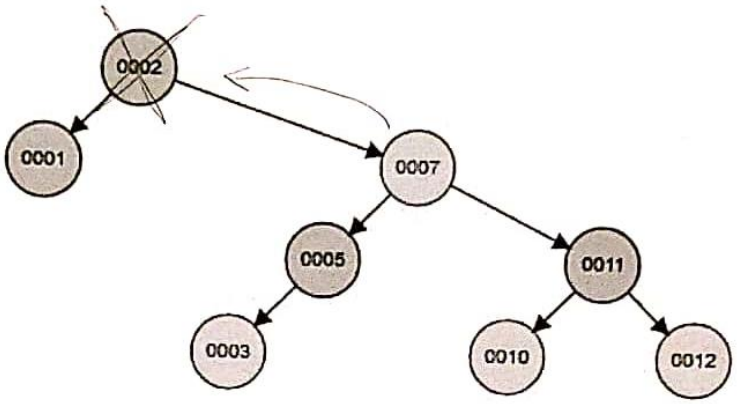
Balanced

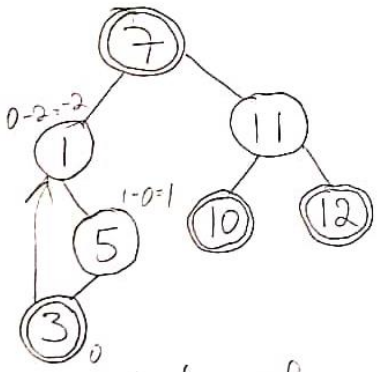
step 2



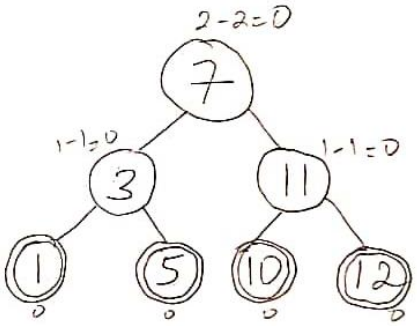
recolor 7 and 10

9.



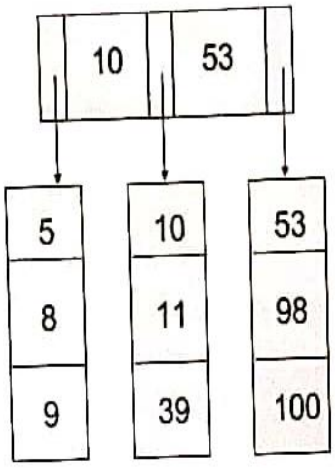


unbalanced and recolor

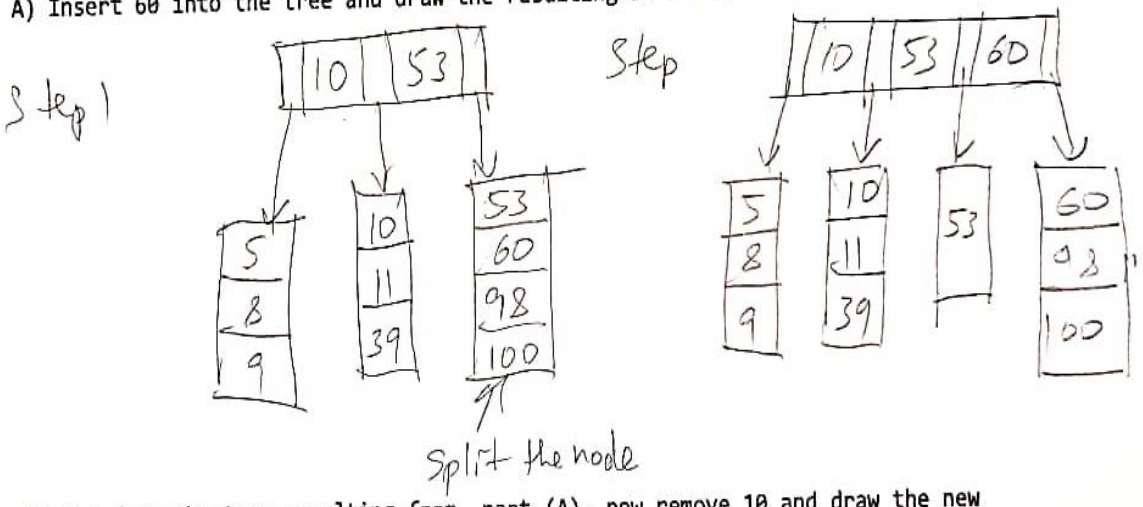


Balanced

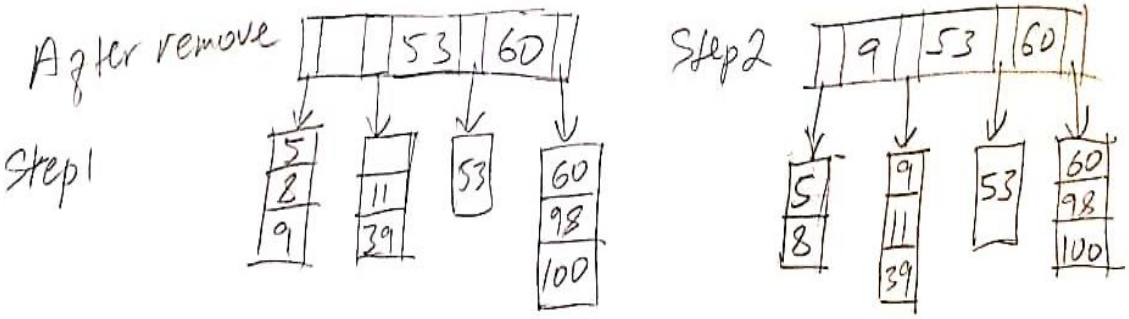
10.



A) Insert 60 into the tree and draw the resulting B+ Tree:



B) Based on the tree resulting from part (A), now remove 10 and draw the new tree:



11.

Calculate the size of the internal nodes (M) for our B-tree:

- There are 5 internal nodes that has 5 children.

Calculate the size of the B-tree leaf nodes (L) for this tree make sure to include the pointer (note CPU architecture!) to keep the list of leaf nodes:

- There are 6 leaf nodes

How tall (on average) will our tree be (in terms of M) with N customer records?

- $\log_N(CustomerData\ records)$ = M

If we insert 30,000 CustomerData records, how tall will be tree be?

- $\log_5 30000 = 6.4 \approx 6$

If we insert 2,500,000 customers how tall will the tree be?

- $\log_5 2500000 = 9.15 \approx 9$