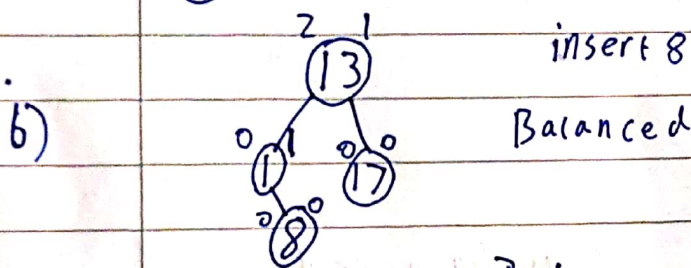
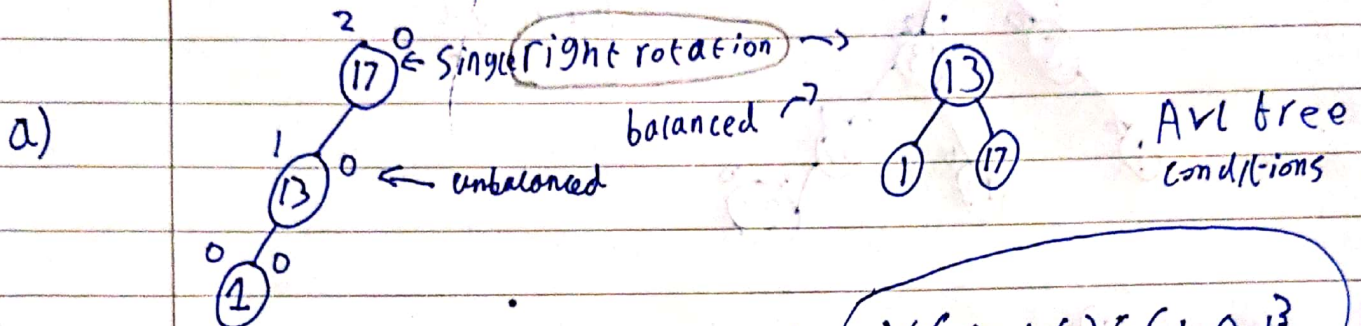
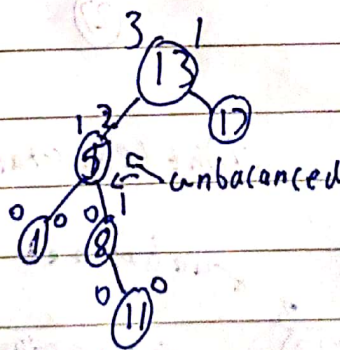
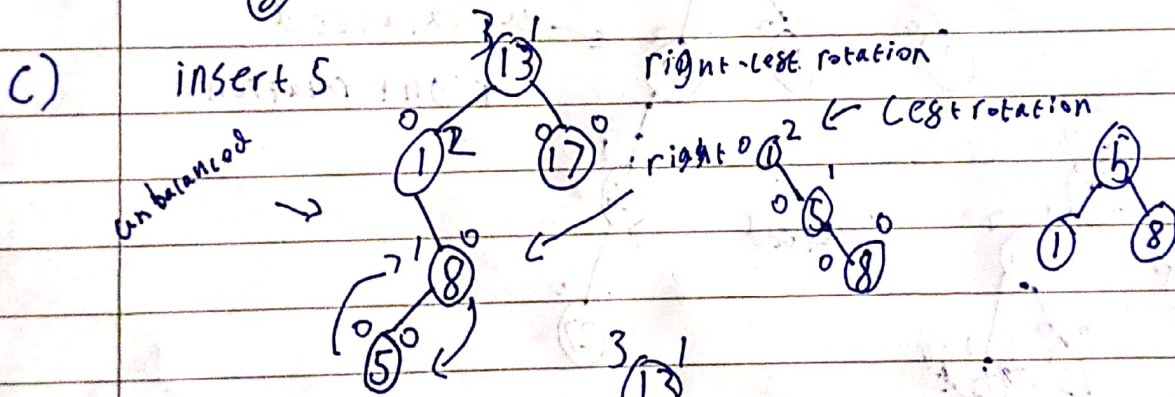


# Practical task 7.1 - AVL Trees

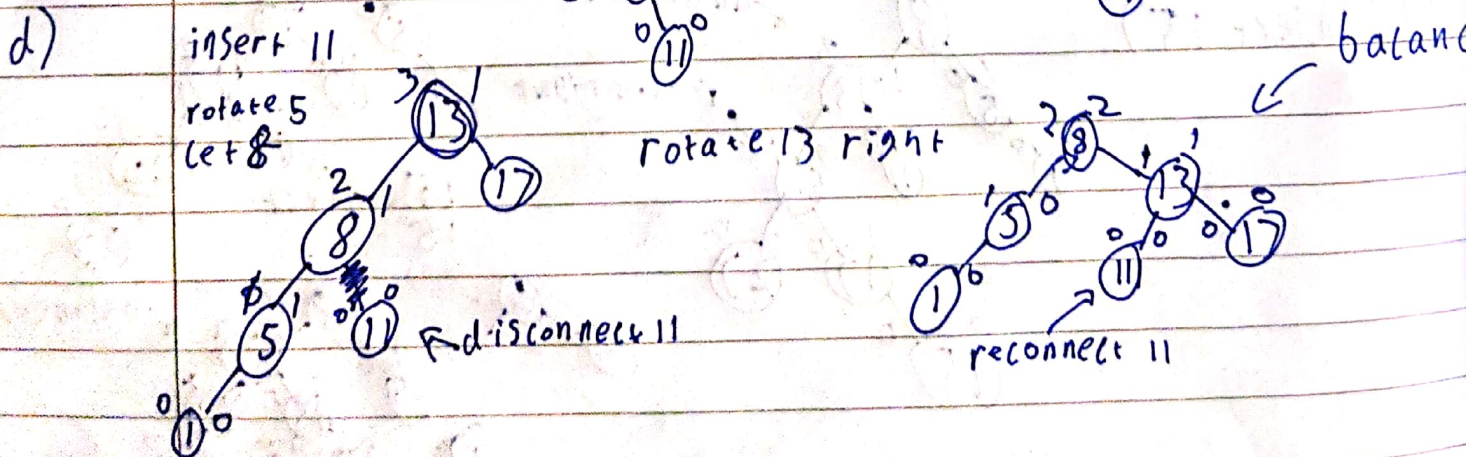
1) 17, 13, 1, 8, 5, 11, 24, 27, 15, 6, 16



$V \in T, b(V) \in \{-1, 0, 1\}$

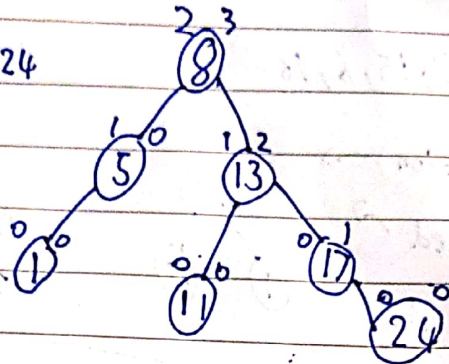


~~rotate 5 left~~



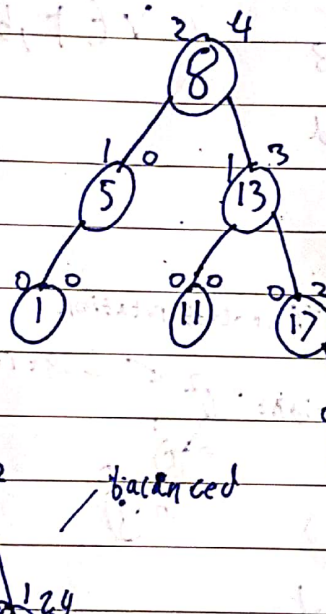


e) Insert 24

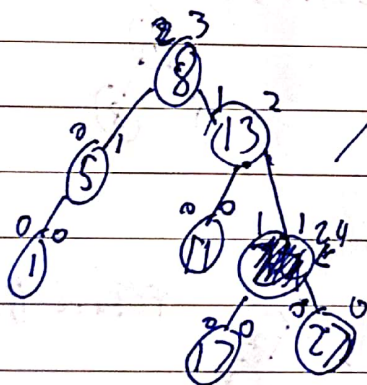


Balanced

f) Insert 27



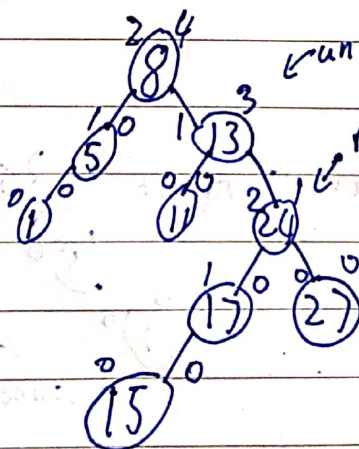
← unbalanced  
right rotation



balanced

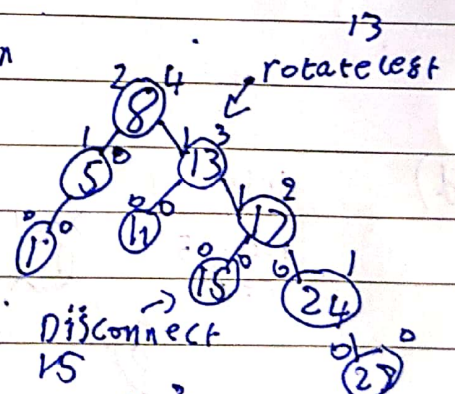
right left rotation

g) Insert 15



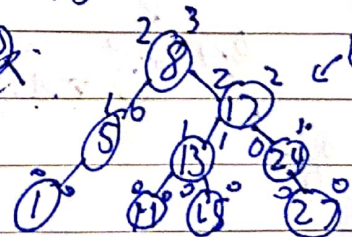
← unbalanced

rotate right



Disconnect  
15

← balanced



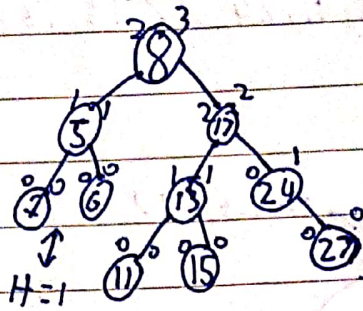


H)

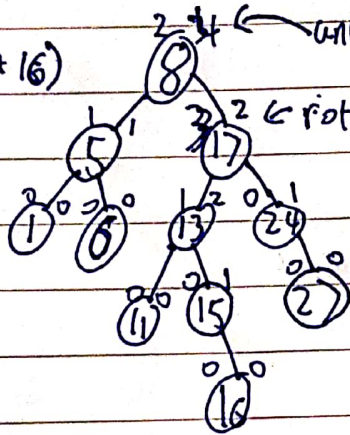
insert 6)

difference = 1 ✓✓

Balanced

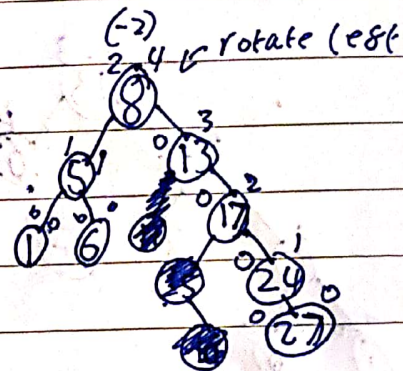


I) insert 16)

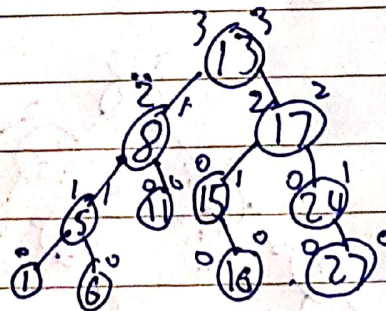


unbalanced

rotate right



11, 15, 16 gets disconnected and reattached



Balanced

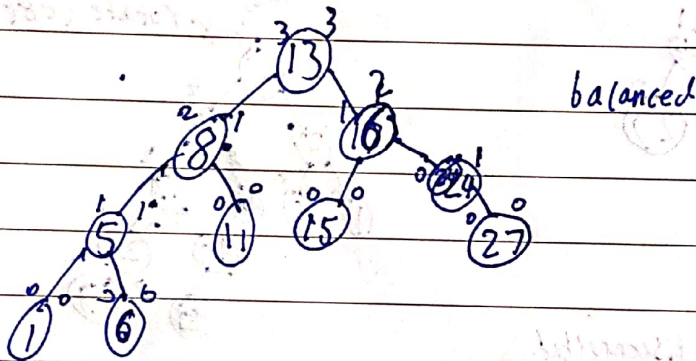
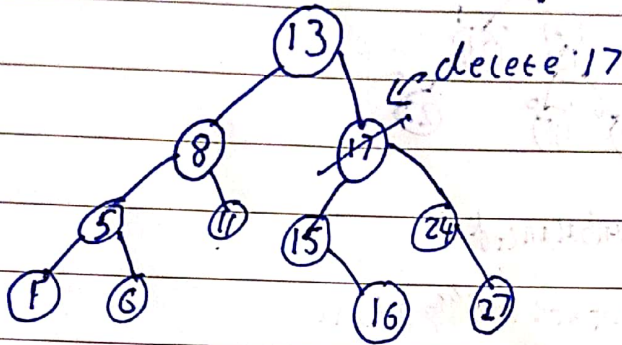


2)

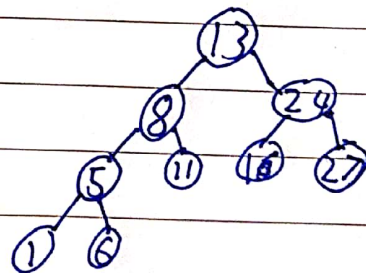
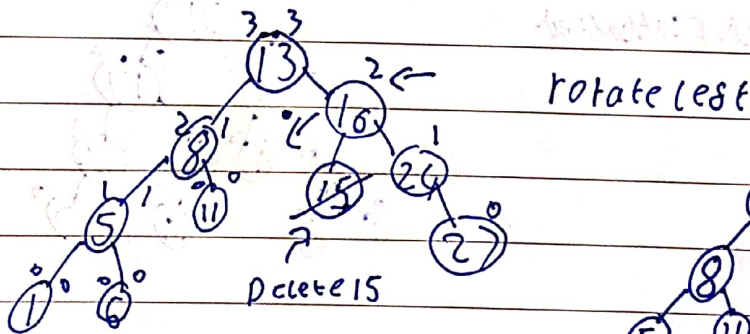
Delete

17, 15, 11, 24, 27, 13, 16, 5, 6, 1, 8

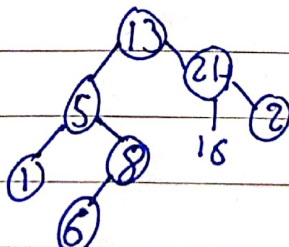
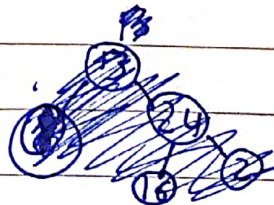
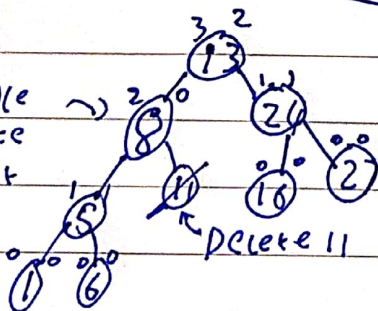
delete 17



Delete 15

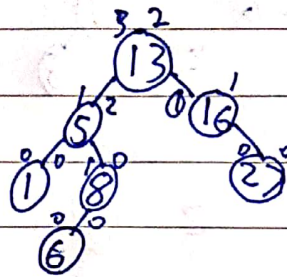
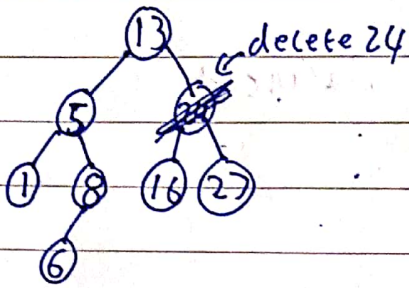


Delete 11 Single rotate right



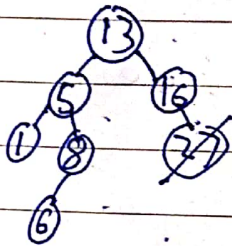


Delete 24)

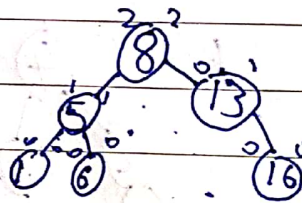
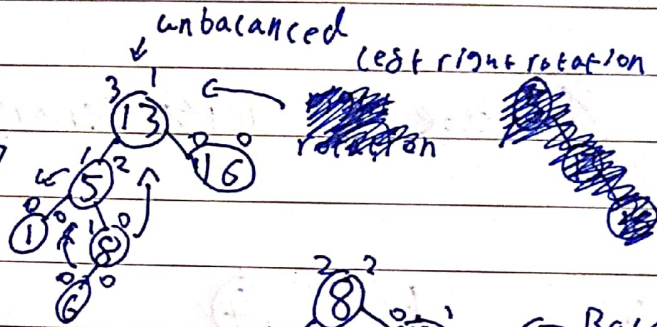


Balanced

Delete 27)

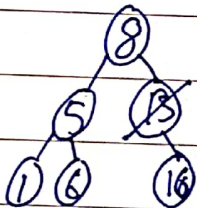


← delete 27

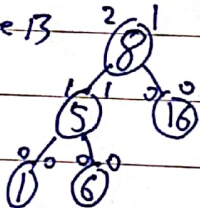


← Balanced

Delete 13)

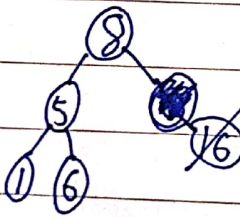


← delete 13

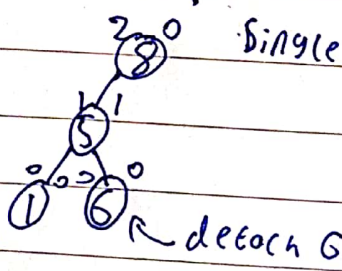


← Balanced

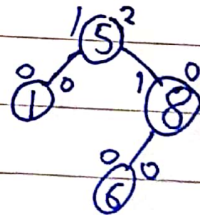
Delete 6)



← Delete 6

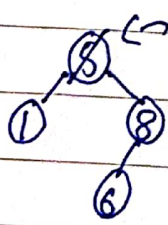


Single rotate right



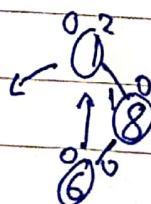
Balanced

Delete 5)

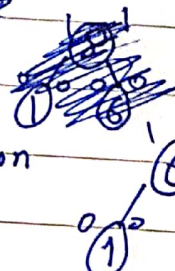


← Delete 5

Keep 1

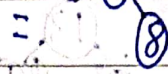
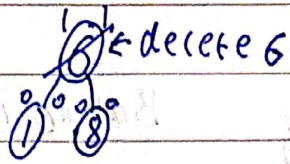


Right left rotation

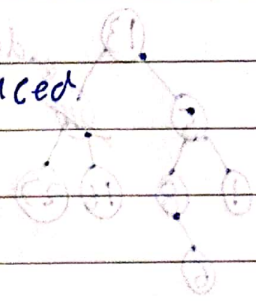


Balanced

Delete 6)

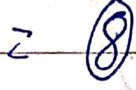
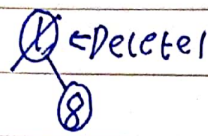


Balanced



(45 215) 10

Delete 1)

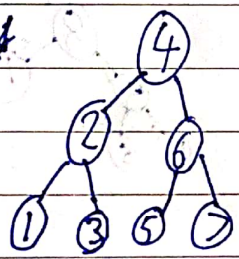


Delete 8)

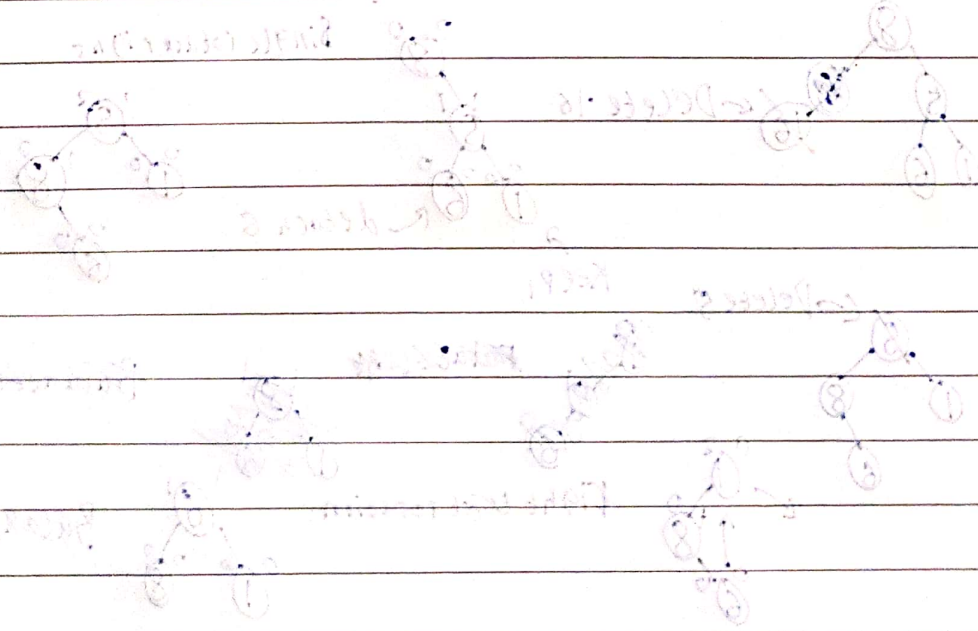
Delete  $\rightarrow$  empty Binary & AVL tree

(75 215) 10

- 3) 1) 4
- 2) 2
- 3) 6
- 4) 1
- 5) 7
- 6) 5
- 7) 3



(8 215) 10



(8 215) 10

(8 215) 10