

`Node * child [26];`

↓
n-ary tree → Tree where each node can have at max \rightarrow children.

→ Binary Tree :- Max 2 children for every node.

struct Node {

int data;

Node * left;

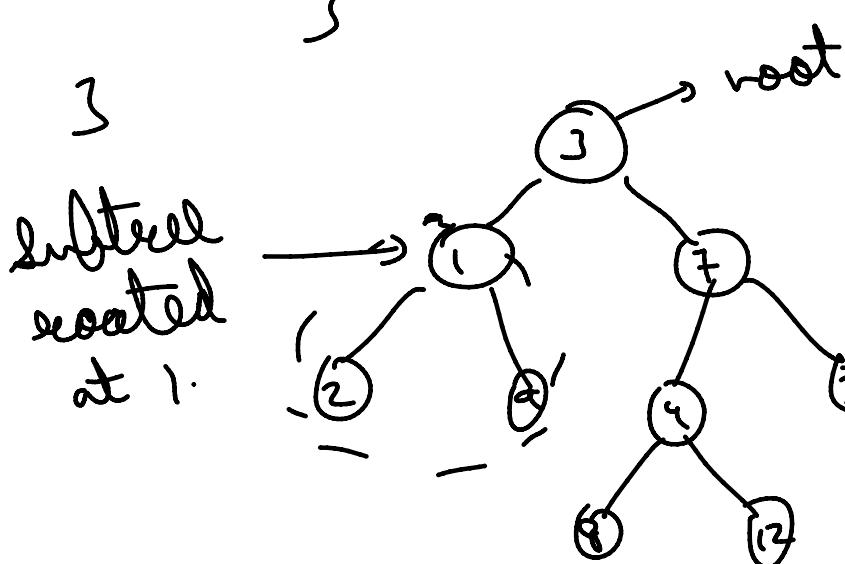
Node * right;

Node (int x) {

data = x;

left = right = NULL;

}



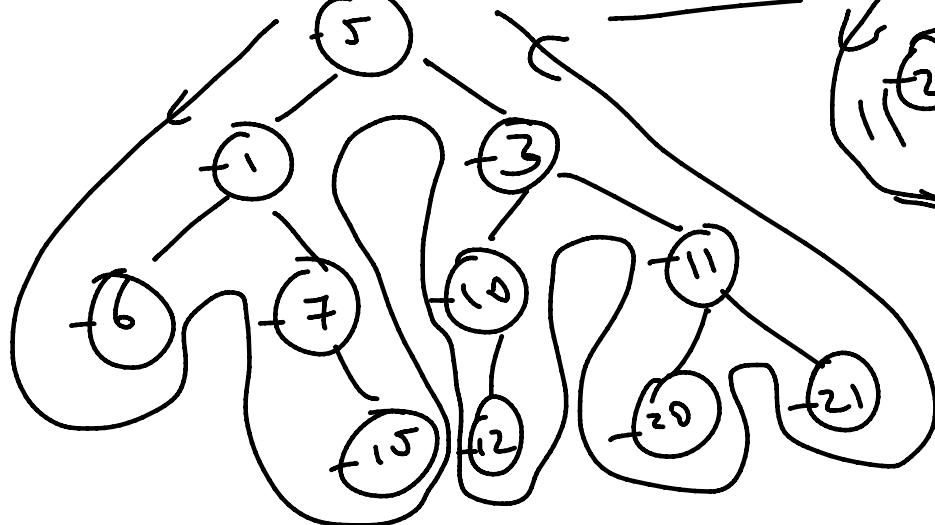
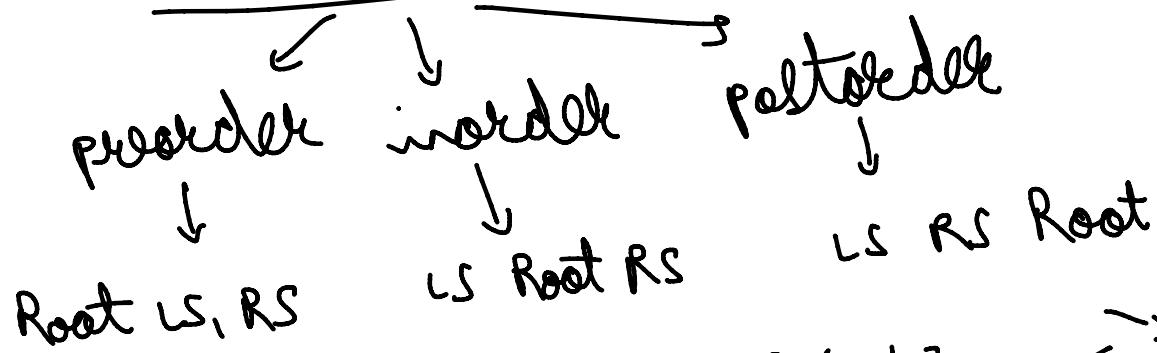
internal nodes -
not leaf nodes

leaf

children
parent
ancestors
descendants

⇒ Terminology :-

\Rightarrow Traversals:-



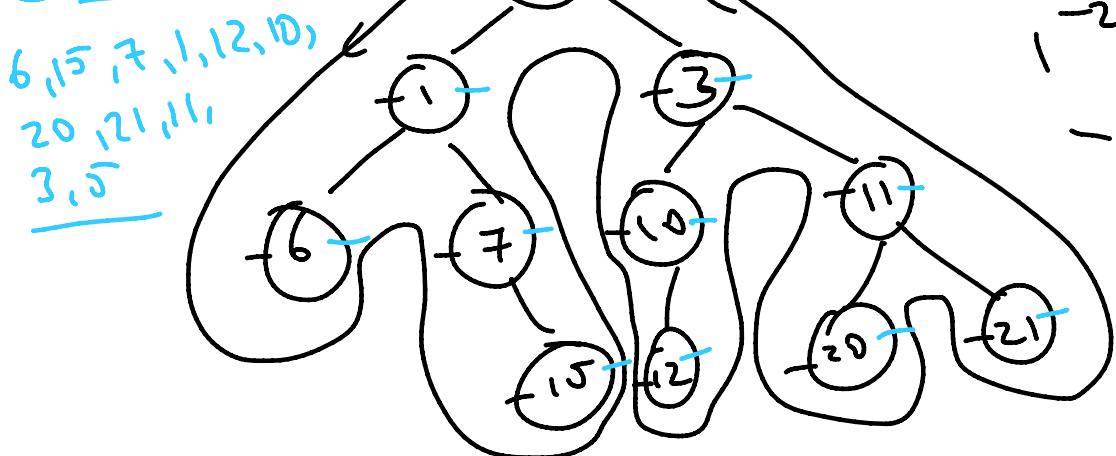
2, 4, 1, 3



1, 2, 4, 5
1, 2, 4, 3

① Preorder :- 5, 1, 6, 7, 15, 3, 10, 12, 11, 20, 21

② Postorder :-

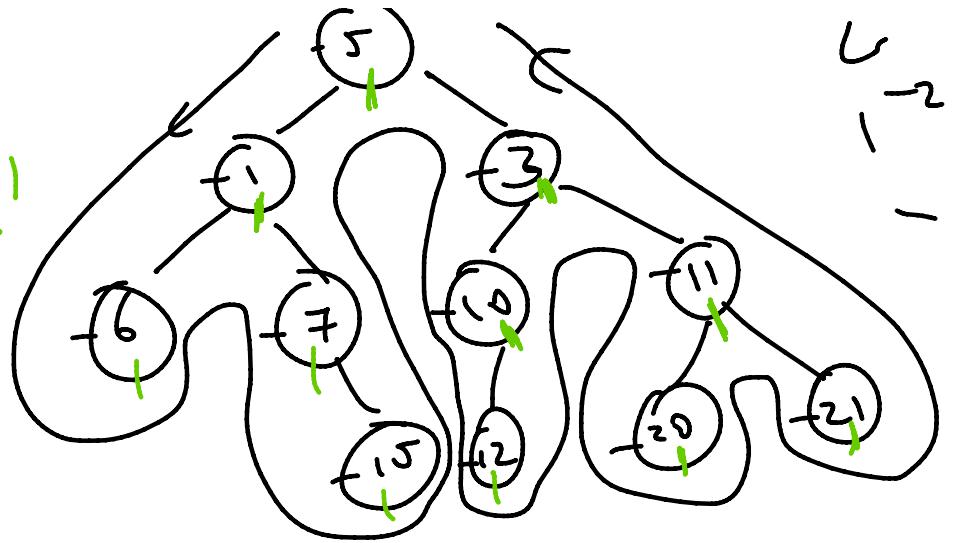


\Rightarrow Inorder :-



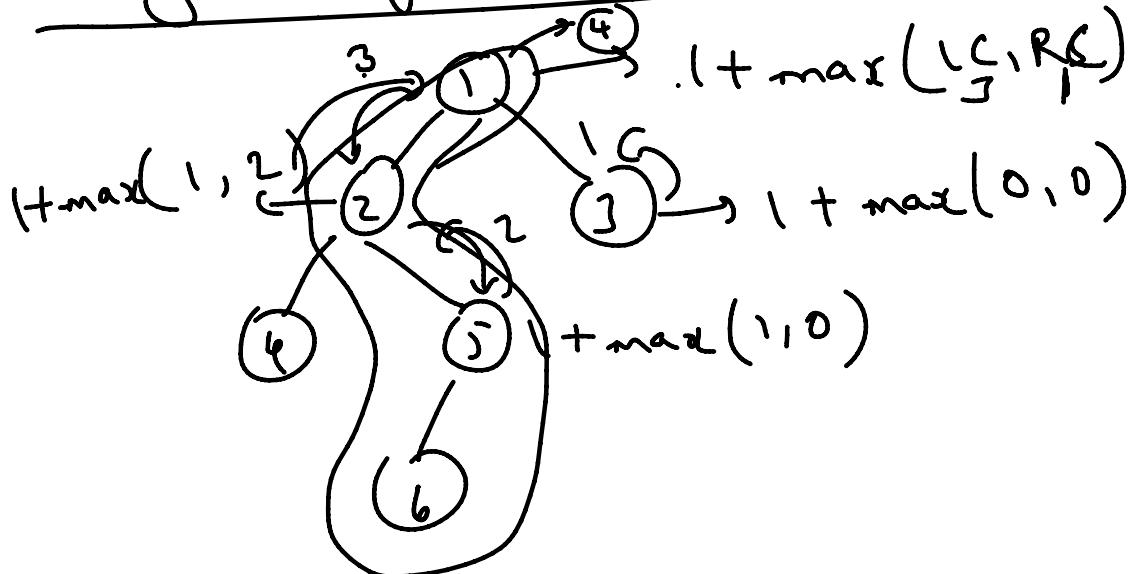
Structure

6, 1, 7, 15, 5
12, 10, 3, 20, 11, 21

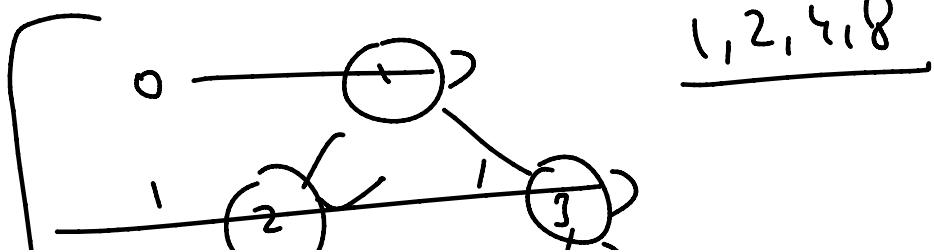


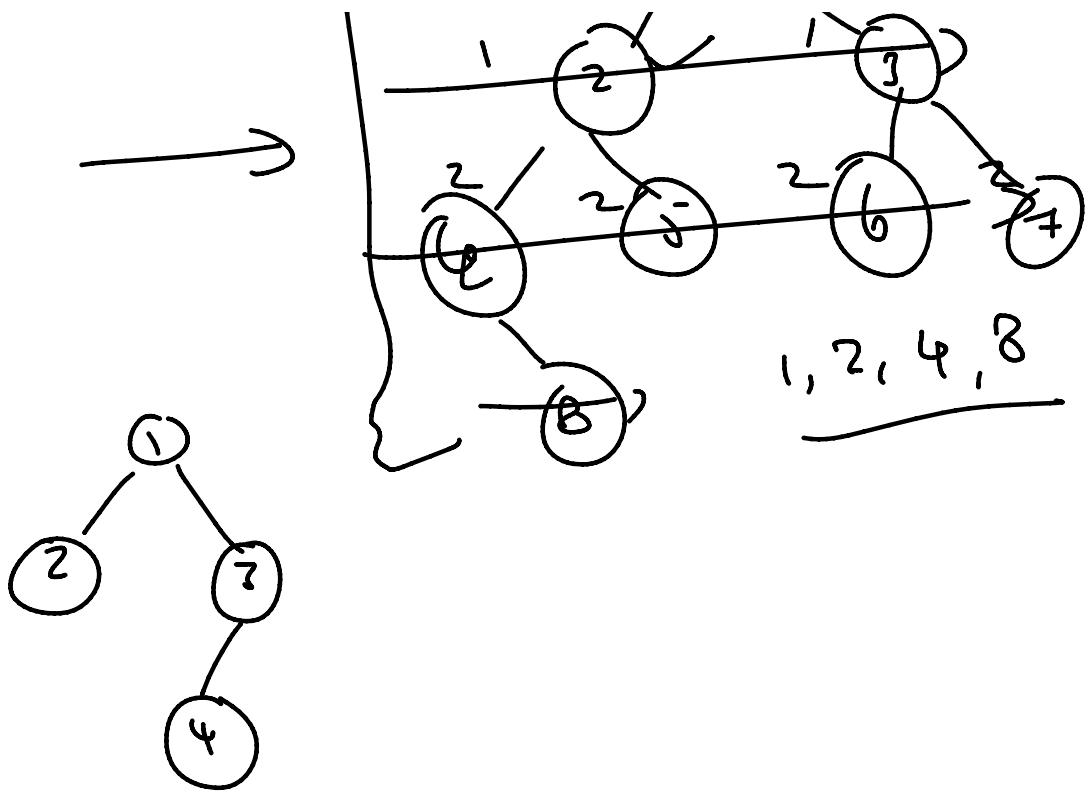
Preorder : Root LS RS ✓
 Inorder : LS Root RS —
 Postorder : LS RS Root ✓

⇒ Height of Binary Tree:-

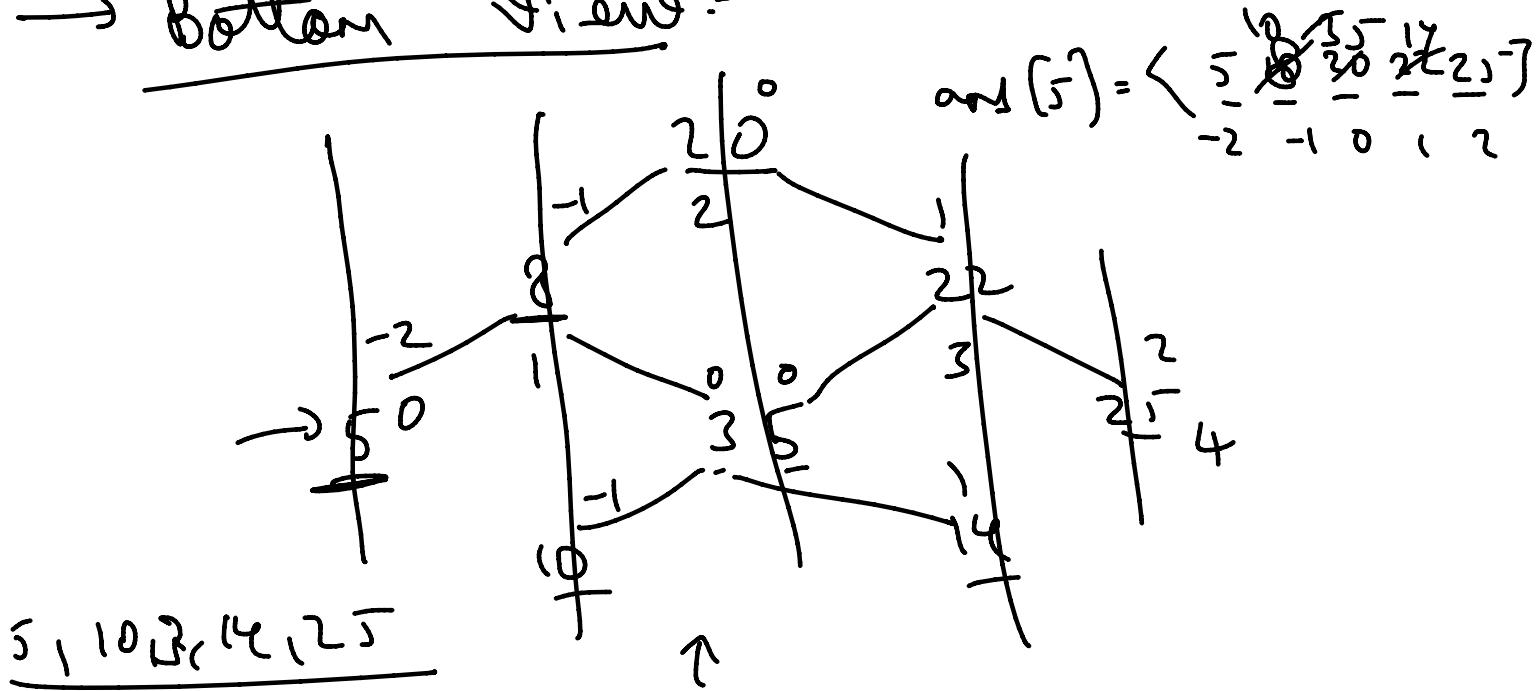


⇒ Left View

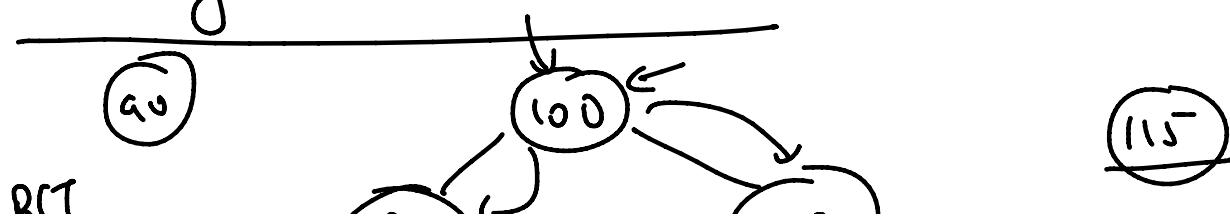


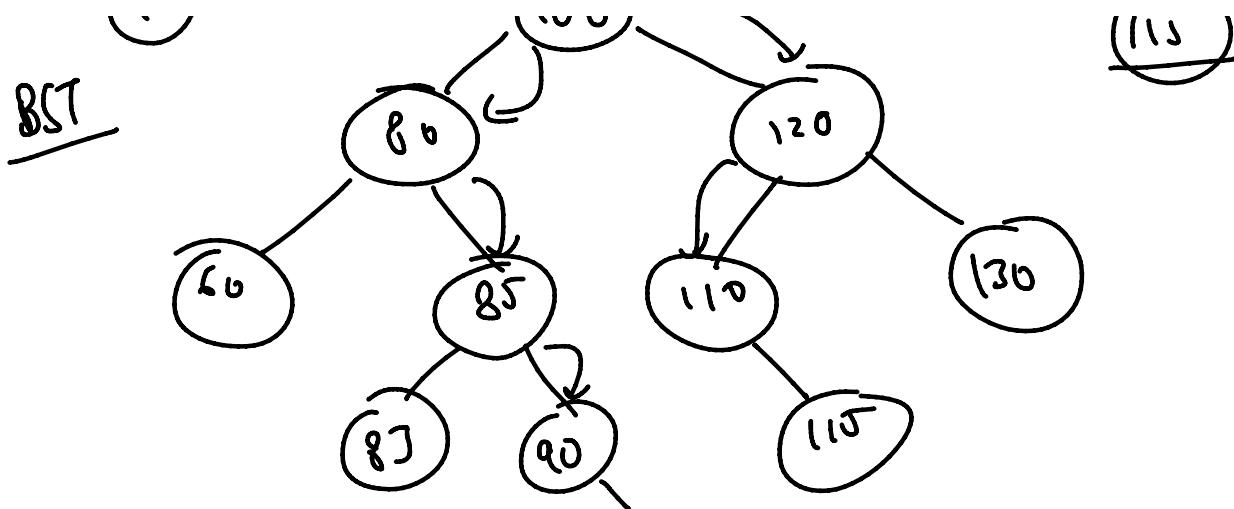


→ Bottom First :-



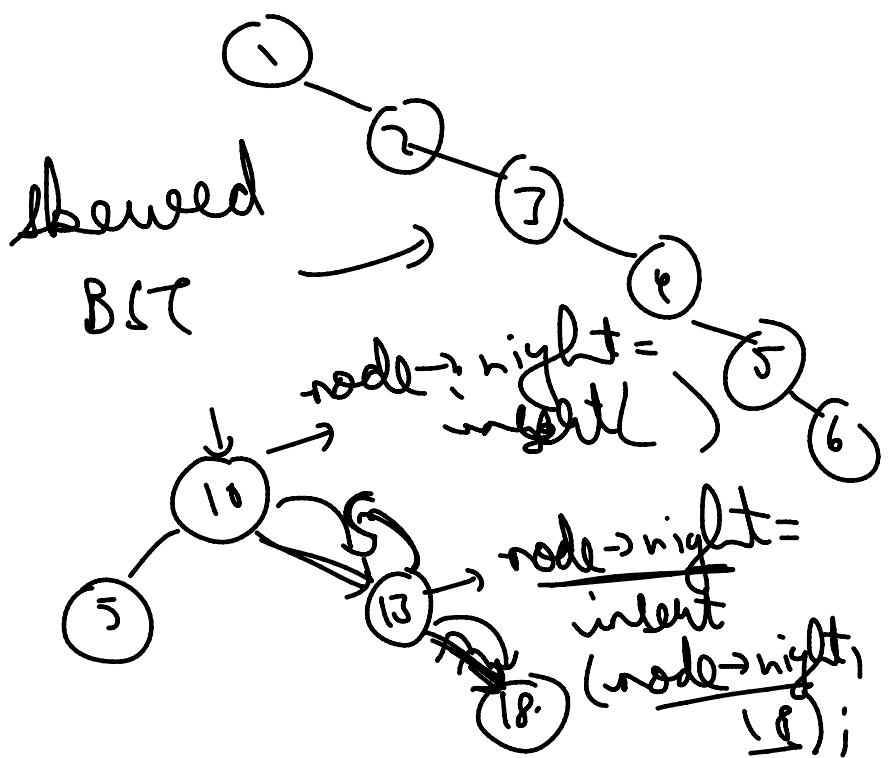
⇒ Binary Search Tree :-



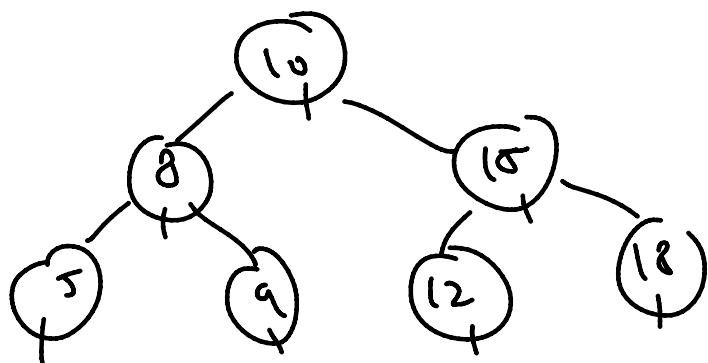


Insertion :-

$O(n)$



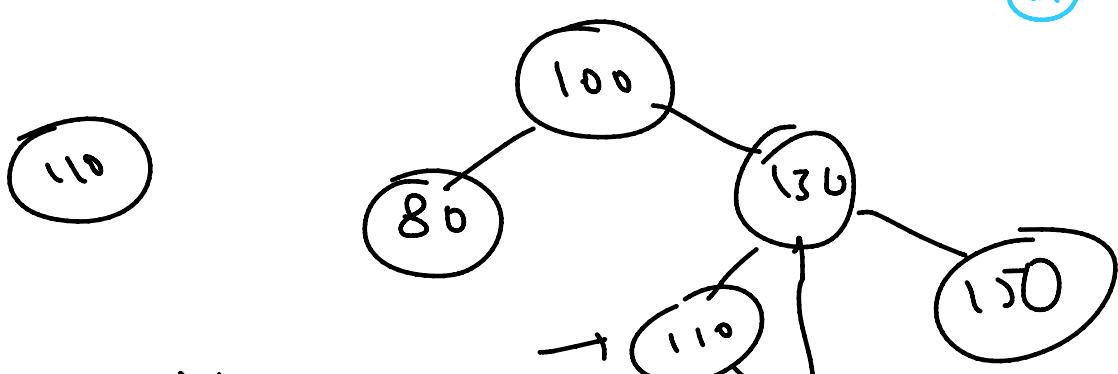
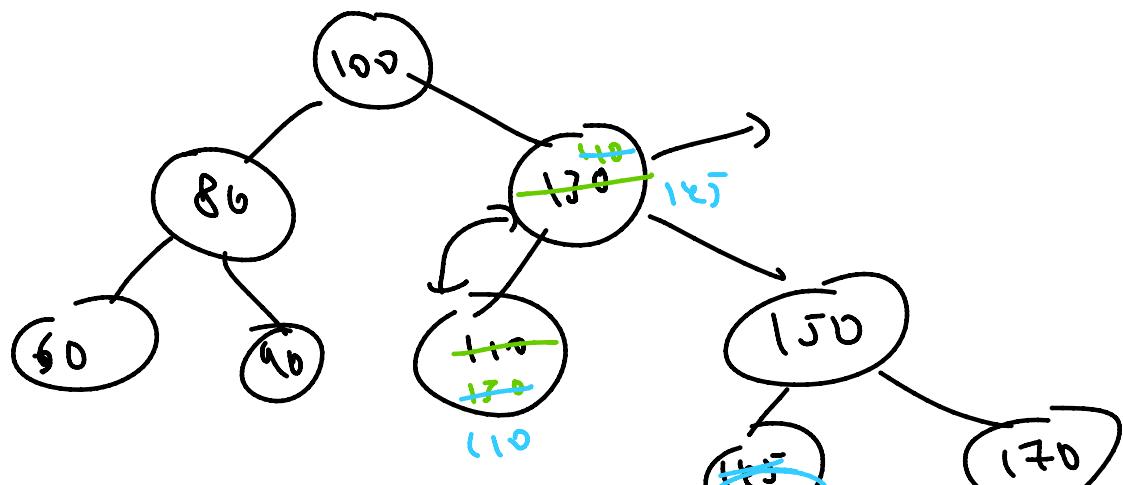
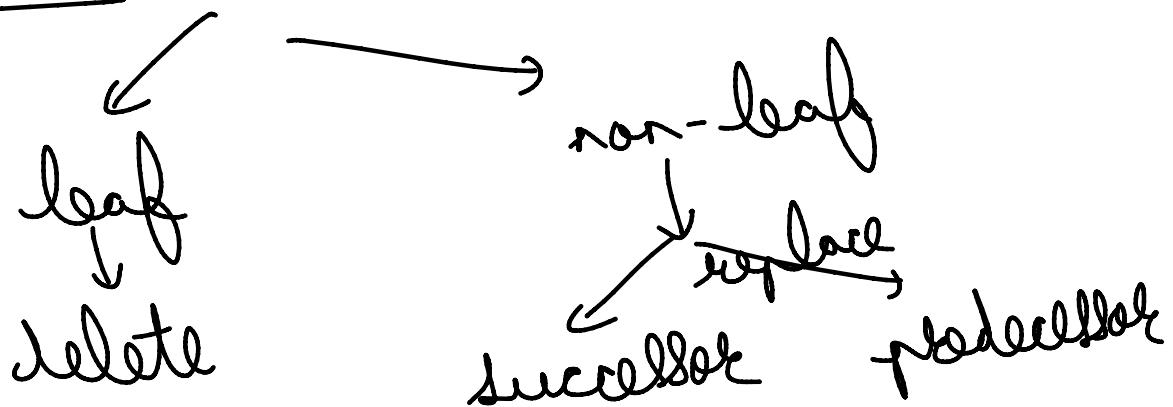
=>



5, 8, 9, 10, 12, 15, 18

node successor
node predecessor

⇒ Delete :-



left subtree == NULL,
attach right subtree

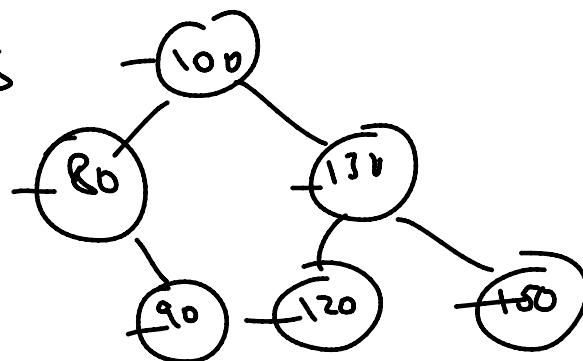
attach right subtree
with parent.
and vice versa.

=>

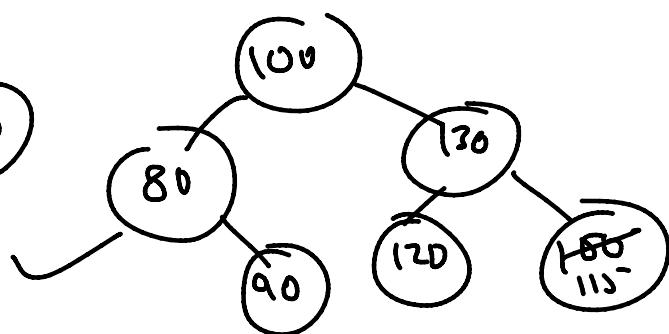


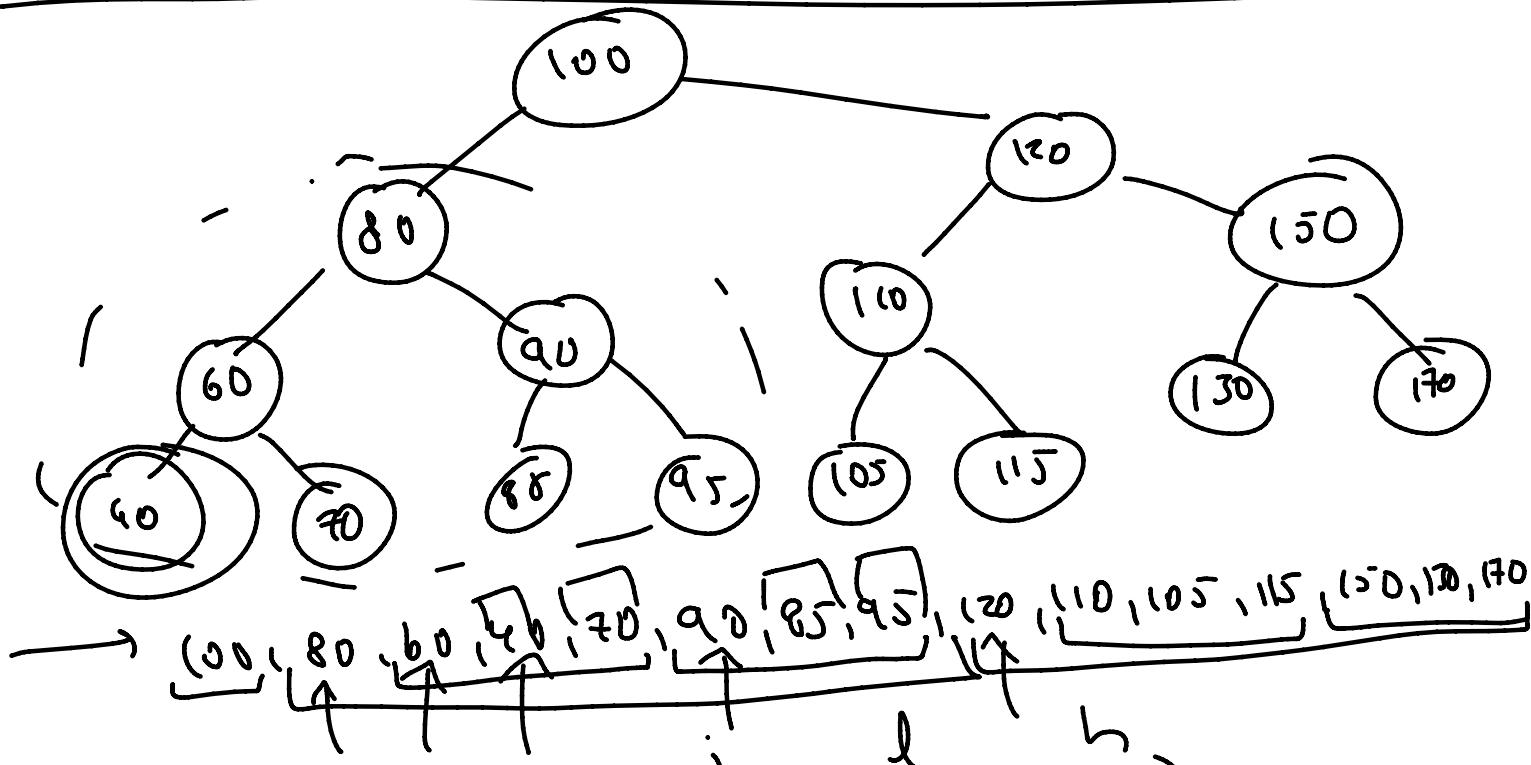
\Rightarrow Given a preorder traversal of a BST, determine whether it is a valid BST.

Root, LS, RS

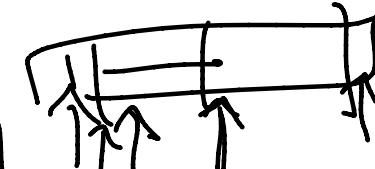


100, 80, 70, 130, 120, 150.
80, 70, 100, 120, 170, 150.





$\rightarrow b_{00} \text{ check}(0, 0, n-1)$

$\left\{ \begin{array}{l} p_1 = \text{check}_1(\text{data}, 0, n-1); \\ p_2 = \text{check}(i+1, i+2, m); \\ p_3 = \text{check}(m+1, m+2, h); \end{array} \right.$


Q. $a = [2, 2, 2, 2, 4, 4, 4, 1, 1, 7]$

$$\begin{cases} x_1=1 \\ x_1=0 \end{cases}$$

$$\begin{cases} x_1=0 \\ x_1=2 \\ n=7 \end{cases}$$

$$x_2=0$$

$$x_2=4$$

$$x_2=0$$

$$\begin{aligned} 1 \oplus 7 &= 6 \\ \Rightarrow & [110] \end{aligned}$$

$$n = (n \oplus n-1) \Leftarrow 100$$

$$\begin{aligned} n \oplus m &= [110] \end{aligned}$$

$$\begin{array}{l} x_1=0 \\ x_1=1 \end{array}$$

$$\begin{array}{l} x_1=4 \\ x_1=0 \\ x_1=2 \\ x_1=0 \end{array}$$

$$\begin{array}{l} x_2=0 \\ x_2=7 \end{array}$$

$$n \oplus m = \underline{\underline{010}}$$

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