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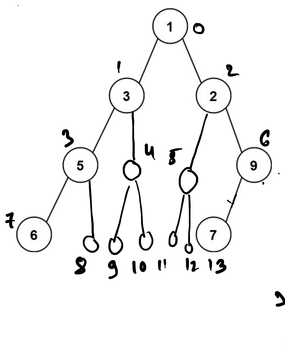

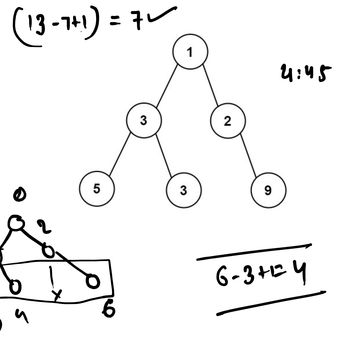

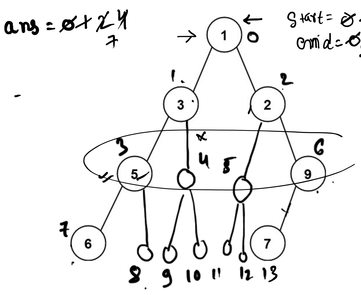

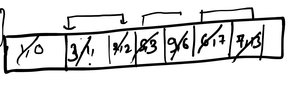

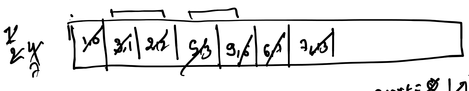

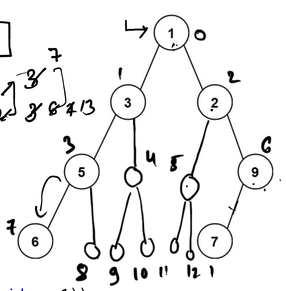

```
public int widthOfBinaryTree(TreeNode root) {
        Queue<Pair> q = new LinkedList<>();
        int width = 0;
        q.add(new Pair(root, 0));
        while (!q.isEmpty()) {
            Pair start = q.peek();
            int s = q.size();
            Pair end = null;
            for (int i = 0; i < s; i++) {
                end = q.poll();
                if (end.node.left != null) {
                    q.add(new Pair(end.node.left, 2 * end.idx + 1));
                }
                if (end.node.right != null) {
                    q.add(new Pair(end.node.right, 2 * end.idx + 2));
                }
            }
            width = Math.max(width, end.idx - start.idx + 1);
        }
        return width;
    }
```