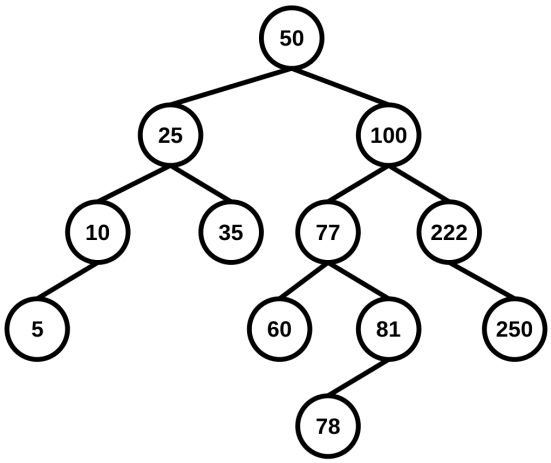
COS212 (Data Structures and Algorithms)

Tutorial 5: Exercise
2021/04/05

Question 1 Heaps and Treaps ..... (8 marks)

1.1 [4 points] The following binary search tree is given:



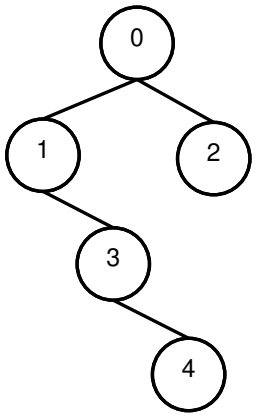
Delete the node `50` from the AVL tree in the figure by copying (using the predecessor), and redraw the final tree after the node has been deleted. What rotations did you have to perform?

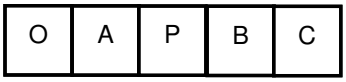
1.2 [2 points] Consider the following min-heap:

```
[1,2,3,4,5,6,7,8]
```

Use Floyd's "heapifying" algorithm to convert the heap into a **max-heap**. Show the resulting array.

1.3 [2 points] Consider the following treap, where node values are stored in an array, array indices are used as node priorities, and node priorities are stored in a min-heap structure that maintains BST properties.

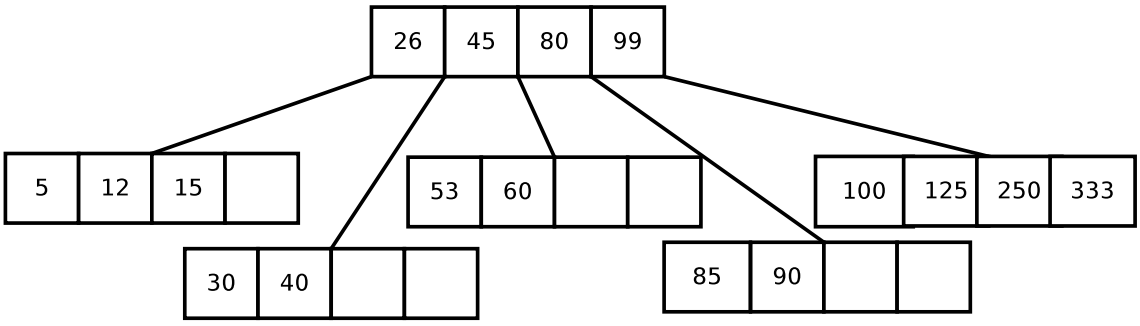




Node `0`, priority 0, is removed from the treap. The values array and the corresponding index min-heap are adjusted accordingly. Show the index min-heap and the values array after the removal of `0`.

Question 2 B-Trees ..... (4 marks)

2.1 [4 points] Consider the following B-tree:



Redraw the final B-tree after value **115** is inserted.