

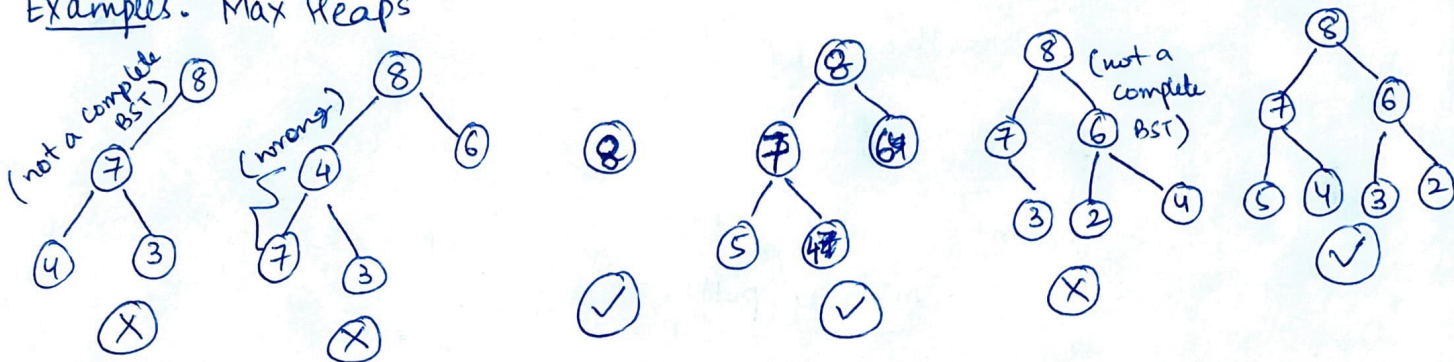
Heap

↳ is a complete binary tree that satisfies:

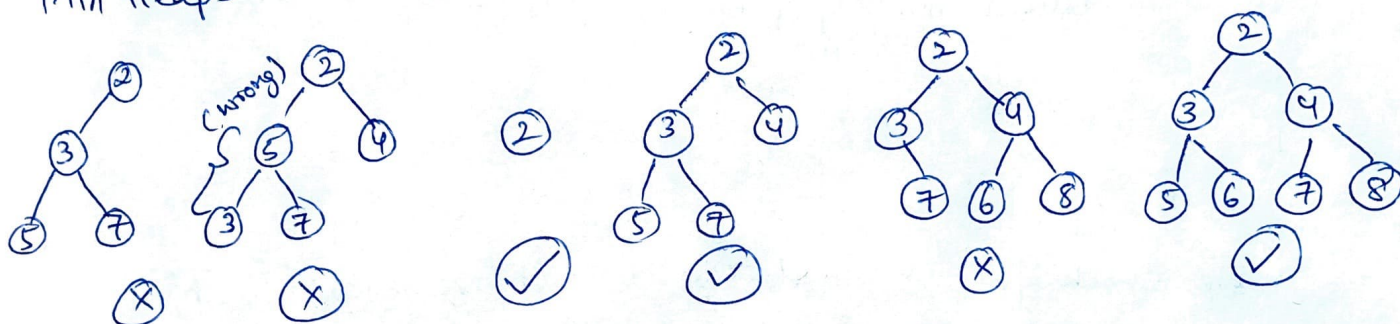
Max Heap - Parent node is greater than or equal to its children.

Min Heap - Parent node is less than or equal to its children.

Examples: Max Heaps



Min Heaps



Q At which position of a heap might the third smallest key be stored?

(In a Min-Heap, the smallest key is at the root (index-0 in an array-based heap) and the second and third smallest might not be in fixed positions because a heap is not fully sorted, only partially ordered.)

Thus, the second smallest & third smallest can be among the children of the root or their children [Index - 0 to 6 = 7 ele's]

[This can be achieved with Priority Queue as well
→
(we did with Array in class)]

```

public class HeapSmallThree {
    public static int find(int[] heap) {
        PriorityQueue<Integer> minHeap = new PriorityQueue<>();
        int n = Math.min(heap.length, 7); (only first 7 nodes are considered)
        for(int i=0; i < n; i++) {
            minHeap.offer(heap[i]);
        }

        for(int i=1; i < 3; i++) { (Pop 3 elements)
            minHeap.poll();
        }

        return minHeap.peek(); (Gives 3rd smallest)
    }
}

```

* We check just a small subset not the entire heap.