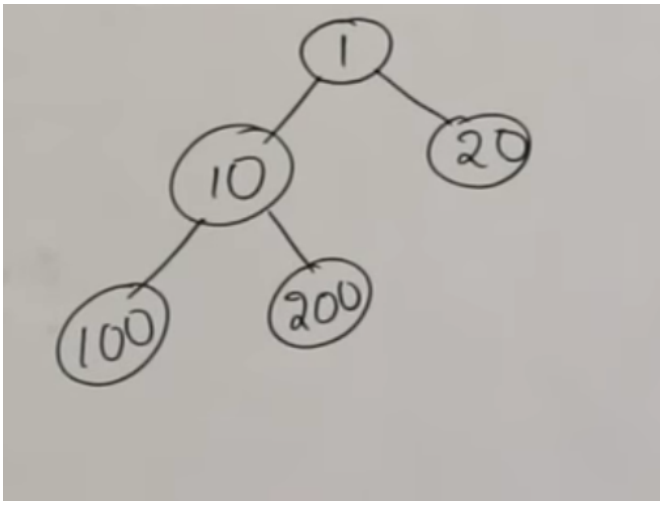
Heap

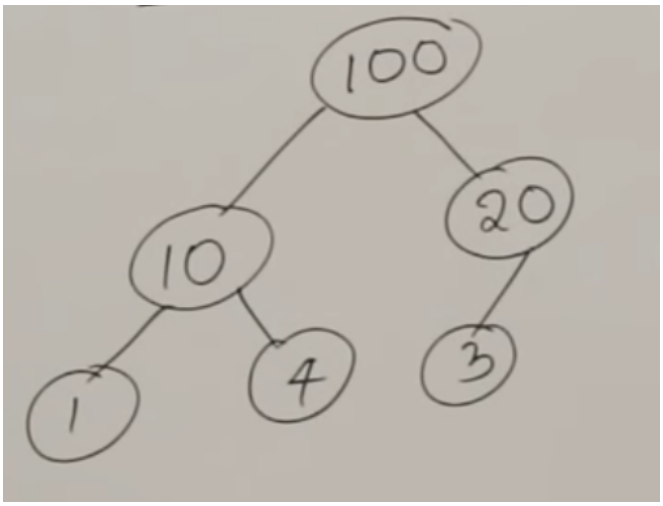
Heap is an almost complete binary tree.
Heap can be:

- Min Heap - root should always be minimum



1 < 10 & 1 < 20
10 < 100 & 10 < 200

- Max Heap - root should always be maximum



100 > 10 & 100 > 20
10 > 1 & 10 > 4
20 > 3

Max Heap

Implementing by an array (take above example)
Root - arr[1] - 100
Left child index = index of parent * 2
Right child index = index of parent * 2 + 1
Therefore, index of 10 = 1*2 = 2

index of 20 = 1*2+1 = 3
index of 1 = 2*2 = 4
index of 4 = 2*2+1 = 5
index of 3 = 3*2 = 6

Finding parent of an node = Math.floor(I/2); i = index of child

Maximum number of nodes in a complete binary tree is 2^{h+1}-1 where h = height of tree (level of root)

Height of tree = Math.floor(log n); where n is total number of nodes

Indexes of leaf nodes Math.floor(n/2)+1 to n are all leaf nodes

Number of nodes at a level = Math.ceil(n/2^{h+1}); h = level, n = number of nodes