Data Structure Homework 4

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Question 1

(a.) Let n = T's level, then $2^{n-1} - 1 < node <= 2^n - 1$ (since T is a complete binary tree). Therefore, $2^{n-1} - 1 < 400 <= 2^n - 1$, $n = 9$

(b.) Complete binary tree has $ceil(node/2)$ leaf nodes = $400/2 = 200$.

(c.) Since T is a complete binary tree with 9 levels, it is full on level 6, which has $2^{6-1} = 32$ nodes.

(d.) It stored at `arr[49]`.

(e.) `[1,3,7,15,31]`

(f.) `100`, since `floor(200/2) = 100`

(g.) `150 * 2 + 1 = 301`

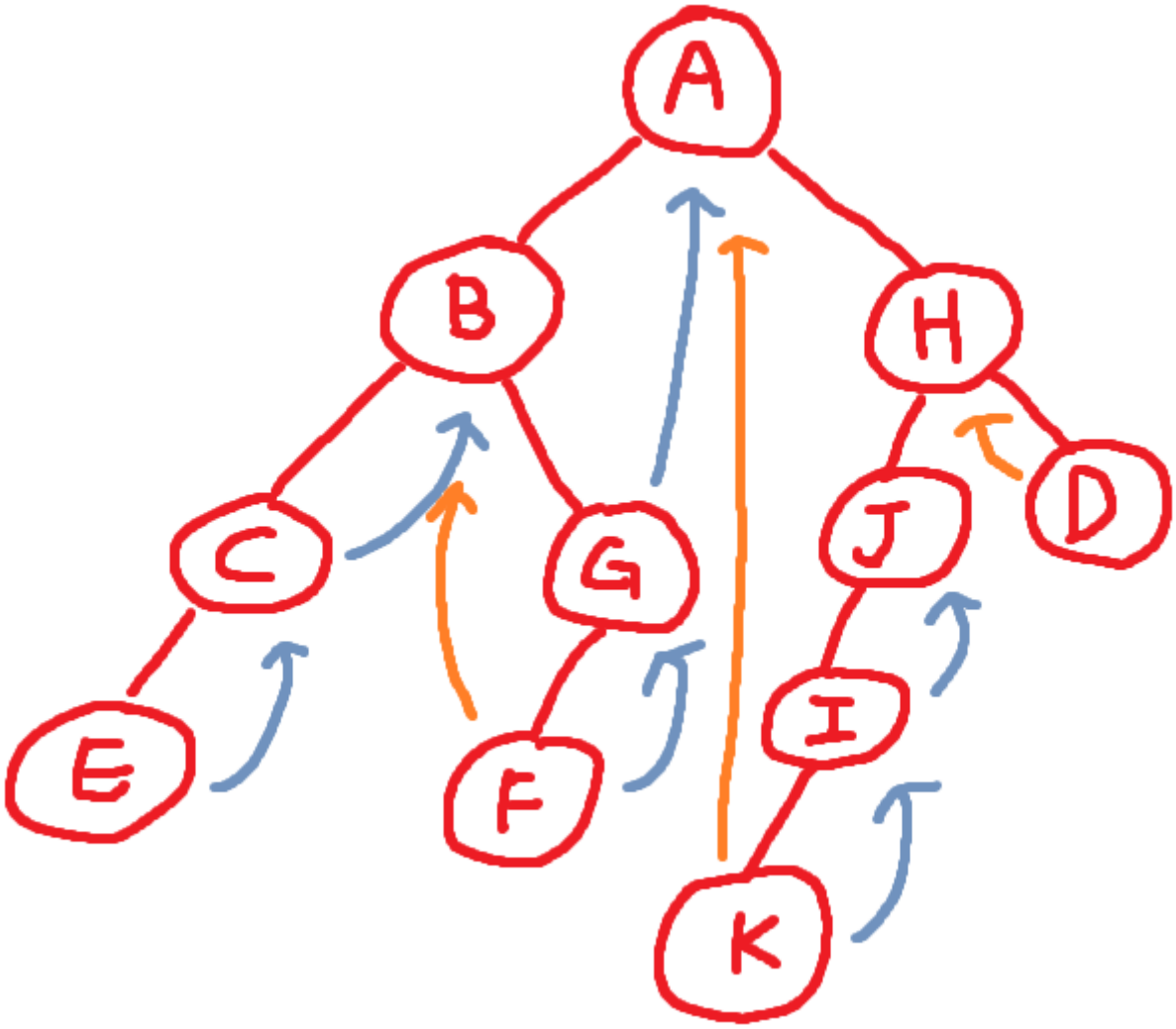
(h.) The first element in a complete binary tree which has n levels should be 2^{n-1} = $2^8 = 256$

Question 2

(a) `ABCEGFHJIKD` (b) `ECBFGAKIJHD` (c) `ECFGBKIJDHA` (d) `ABHCGJDEFIK`

Question 3

(a) `blue is the successor(right threshold), orange is the predecessor(left threshold)`



(b) The original thread tree inorder travesal = `ECBFGAKIJHD`, After insert `L` as `B`'s right node, the inorder travesal become `ECBLFGAKIJHD`. Therefore, there are some modifications for the nodes.

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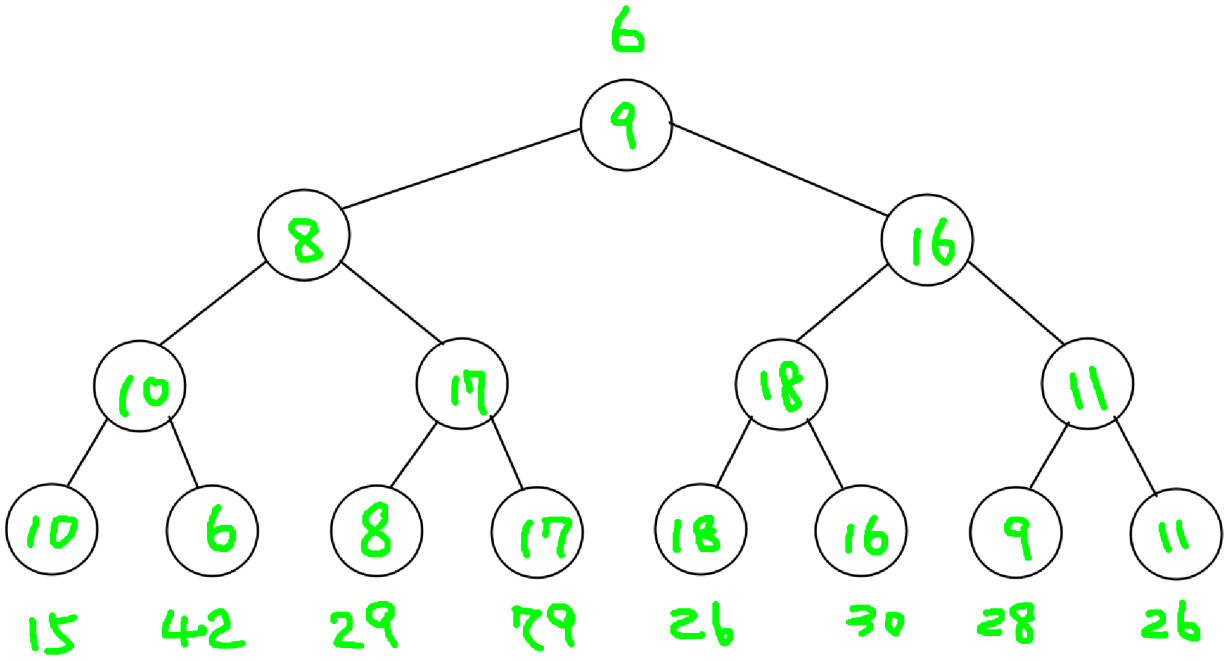
B.right = L (was G)
F.left_thread = L (was B)
```

Question 4

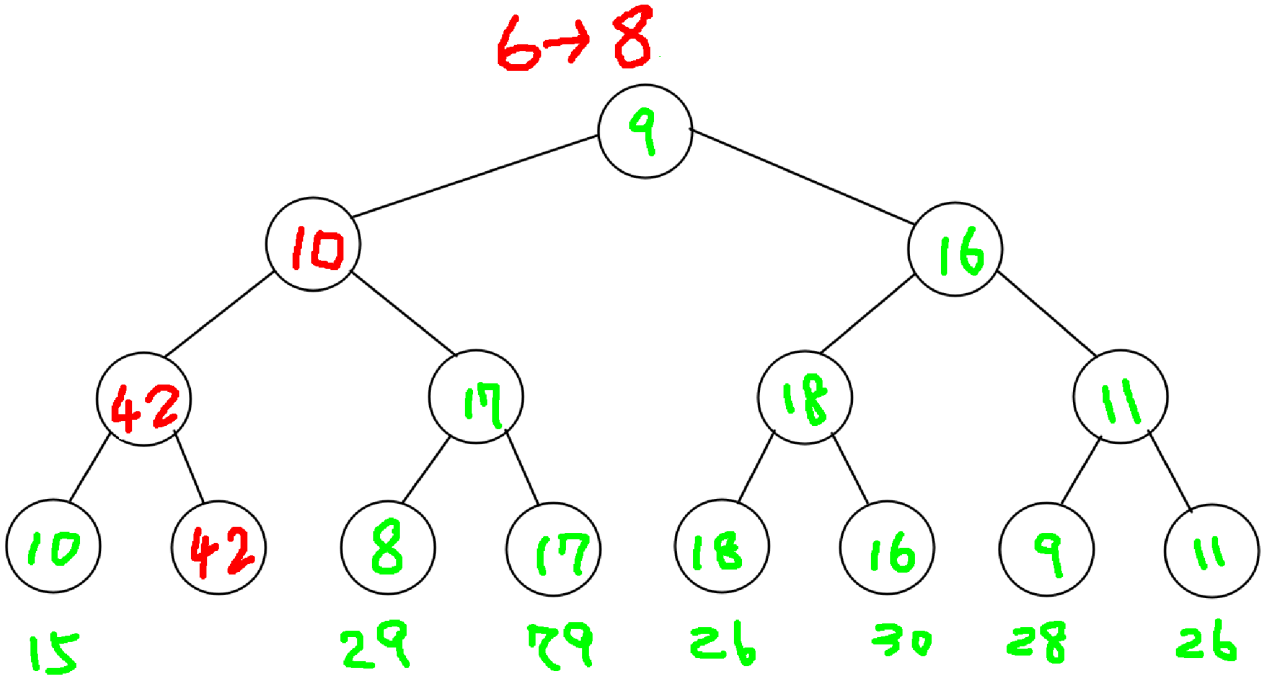
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
heap	20	25	30	35	28	50	65	45	50	43
-min	25	28	30	35	43	50	65	45	50	
+24	24	25	30	35	28	50	65	45	50	43
-min	25	28	30	35	43	50	65	45	50	
+12	12	25	30	35	28	50	65	45	50	43
-min	25	28	30	35	43	50	65	45	50	
+60	25	28	30	35	43	50	65	45	50	60

Question 5

First element



Second element



Therefore, the third element is 9.