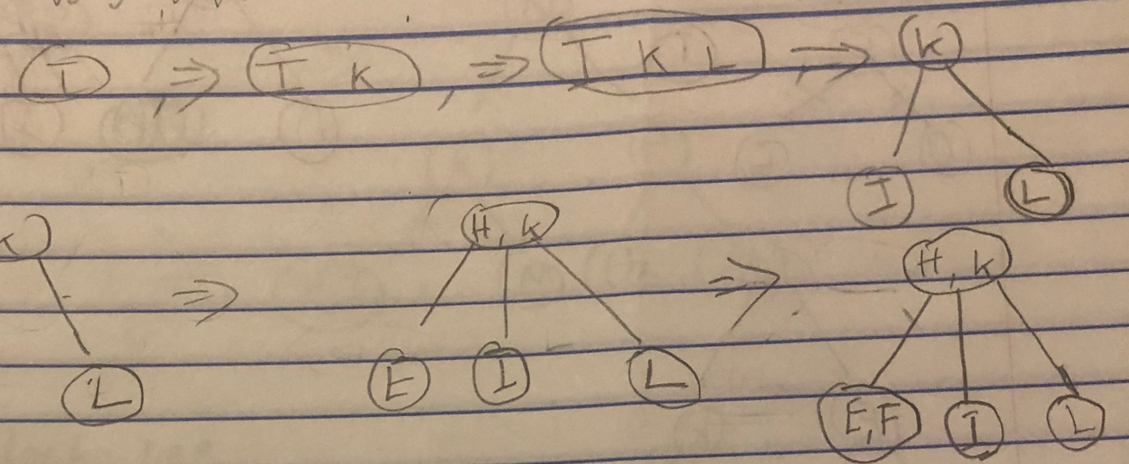
Avi essay..
22
Seng

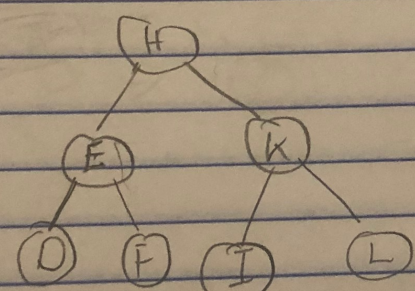
ABC D E F G H I G H K

Written Assignment 2..

1) using distinct letter

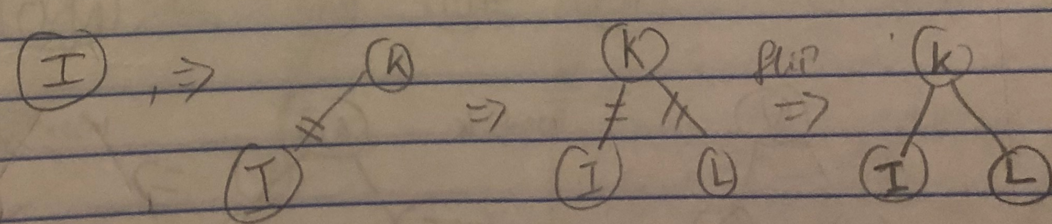
I K L H E F D

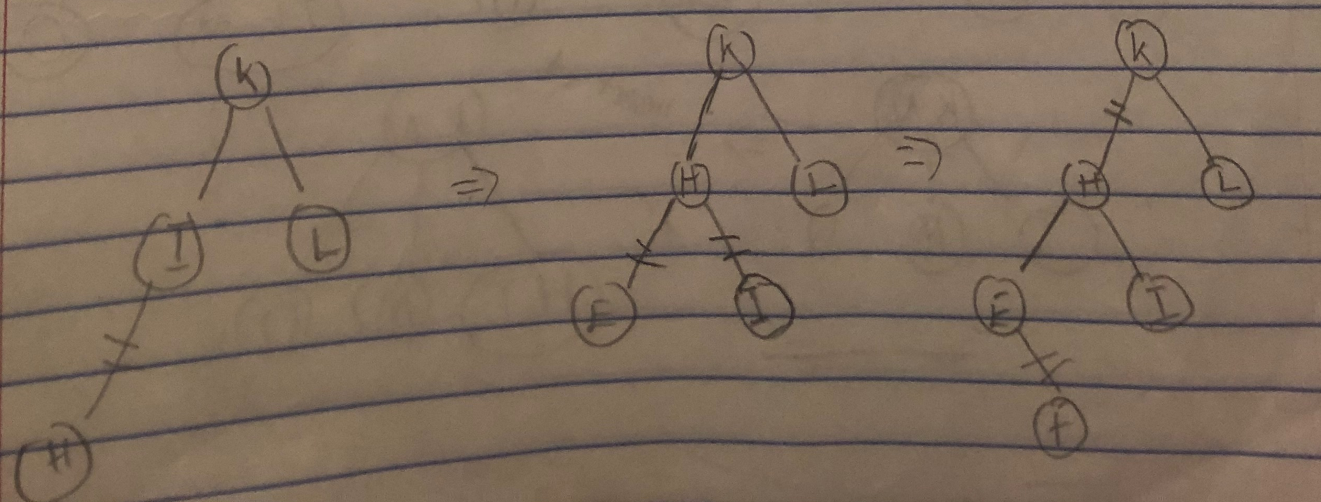


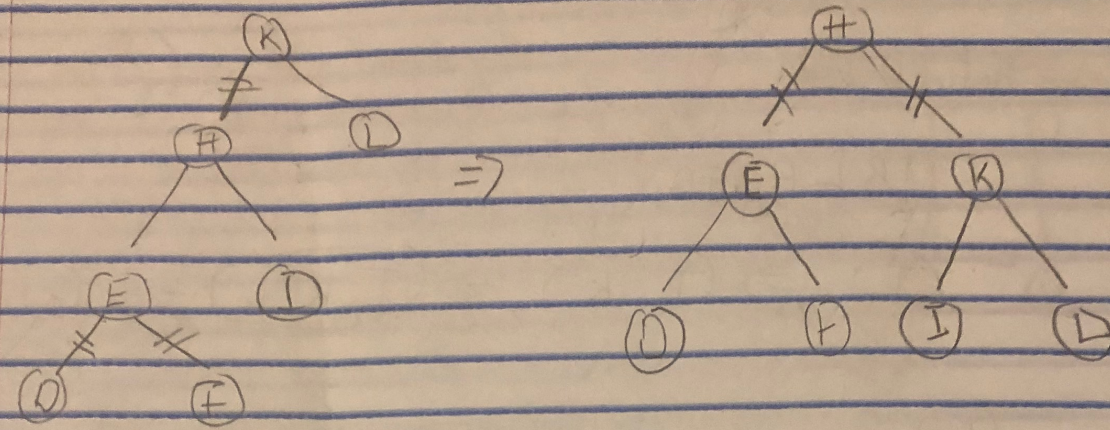


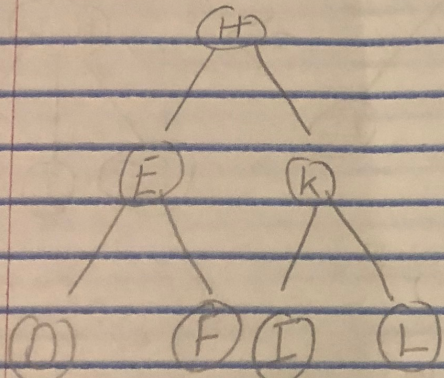
red Black tree.

insert(I)

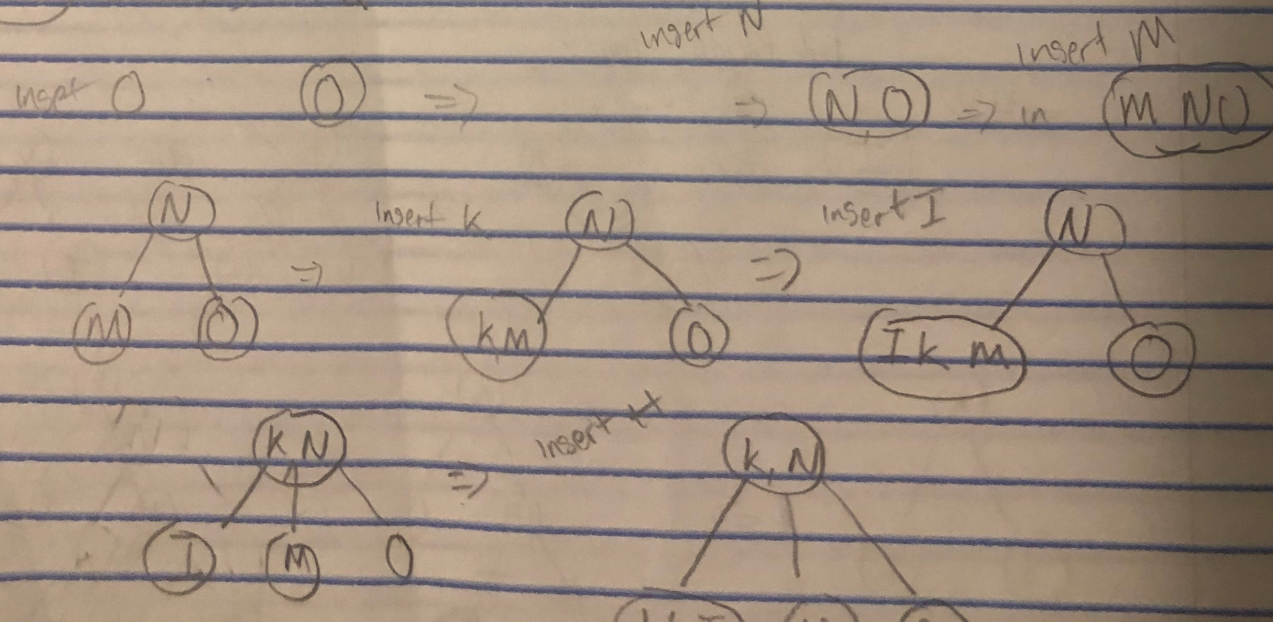




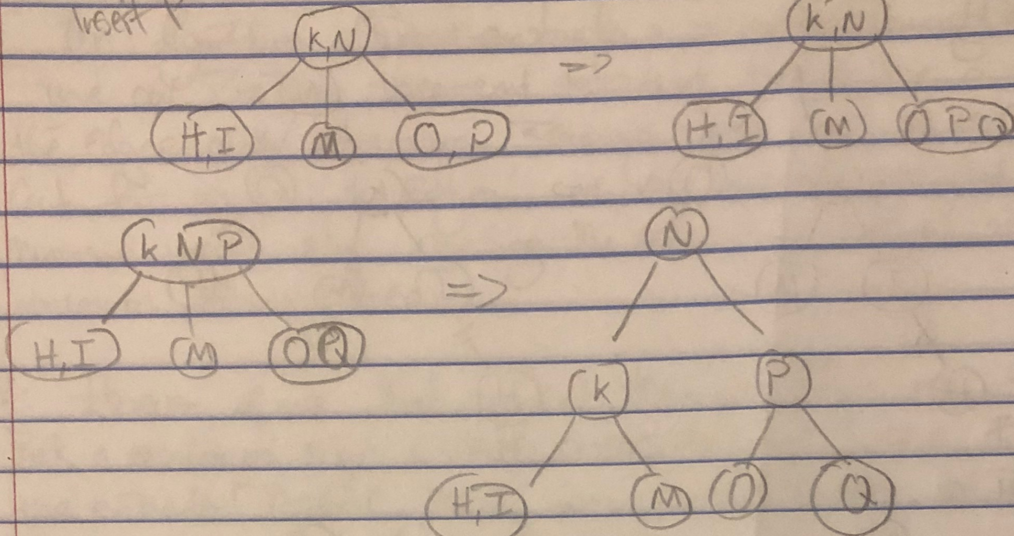

K
H
L
E
I
D
F
H
E
K
D
F
I
L


H
E
K
D
F
I
L

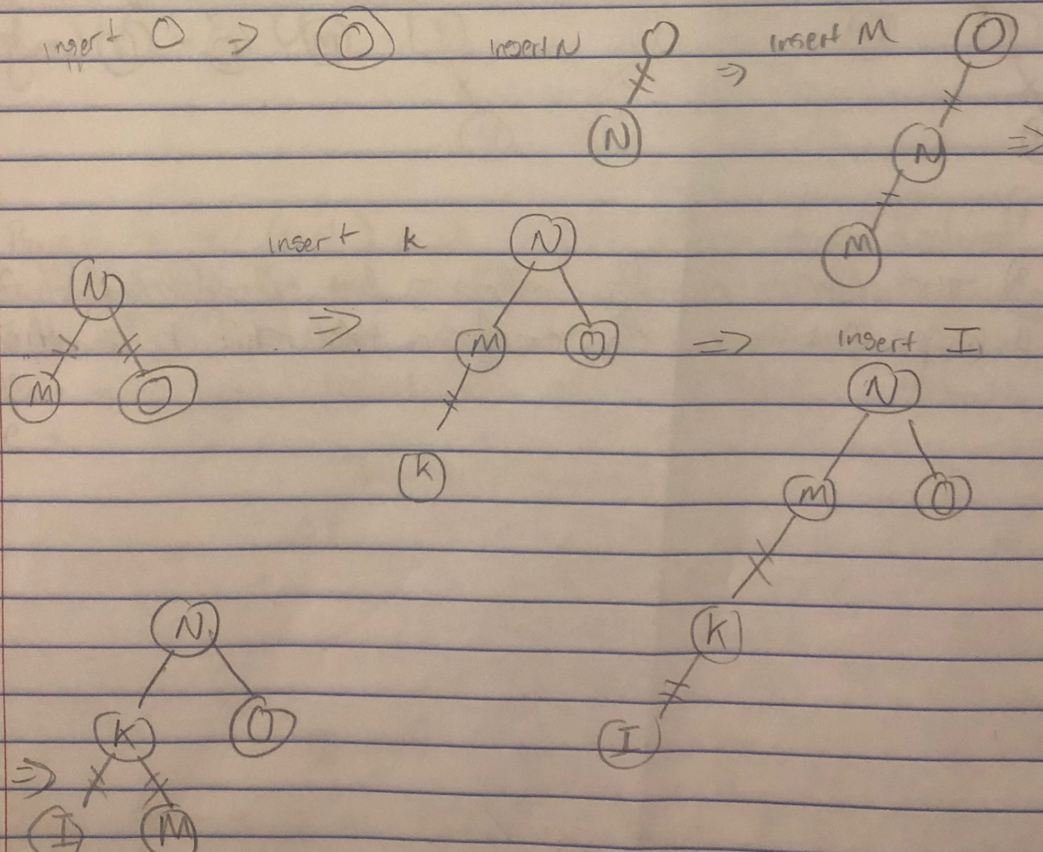
1.2 ONMKIH PQ


insert O
O
insert N
N O
insert M
M N O
N
M
O
insert K
N
K M
O
insert I
N
I K M
O
K N
I
M
O
insert H
K, N
H, I
M
O

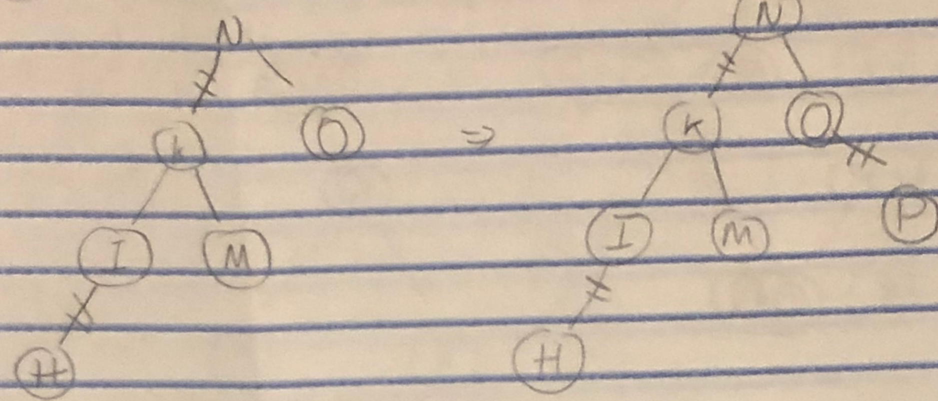
Insert P



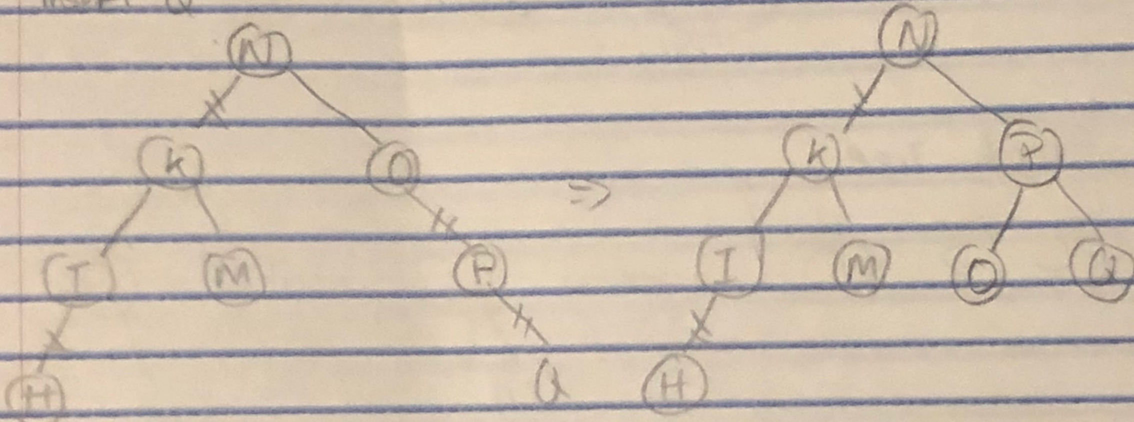
Red Black Tree



insert(H) Insert P



insert Q



(1.8) The number of nodes in the 2 3 tree & red black tree are identically and there is a one to one relationship between them

(2) The Algorithm ~~Contai~~ constructs a minimum spanning tree.

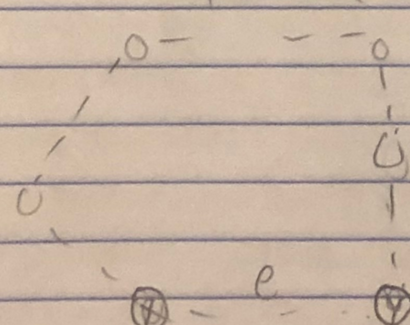
The cut Property theorem states that: let A be a subset of the edges of the minimum spanning tree of G. If $(S, V\setminus S)$ is a cut for which no edges of A crosses the cut, then the minimum weight edge crossing the cut is contained in the minimum spanning tree.

Proof: However if we find any cut that no edge in F crosses and pick a minimum edge e that crosses the cut the $F \cup \{e\}$ is the expanded partial MST, which follows the cut Property theorem that says we can extend a partial MST.

We start with an empty set of edges $F = \phi$ and use the cut Property to greedily expand this partial until it contains n-1 edges.

(3) Prove: If $T = (V,S)$ and $T' = (V,S')$ are two distinct MST for G, let $e = xy$ be the cheapest edge of G that is in one of T or T' but not both. Since all the edge weights are distinct there is a unique cheapest edge with this property. Assume the edge e is in T

Path in T' from x to y

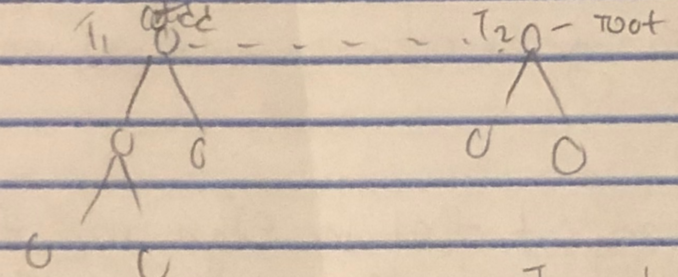


where for every edge on path T' from x to y. $w(e') \geq w(e)$. But since edge weights are distinct, (e) $w(e') > w(e)$. By the way e was chosen, every edge on the path T' from x to y also lies in T.

But these edges of T, Thus the edges & of T form a cycle, contrary to T being a tree.

4) Observation: the height of of the number of vertex changes as the number of vertex changes

Case 1: height of two trees are different



we merge T_1 and T_2 $T_2 \in T_1$ with T_1 becoming child of root of T_2 $|T_1| \geq |T_2|$

$$|h_1 \cup h_2| = |h_1| + |h_2|$$
$$\geq 2|h_1|.$$

Since the height of the tree is at most $\log n$, the number of nodes is at least twice as much, however the increase in height cannot exceed $\log n$. therefore the height of any tree which is the largest depth will not exceed $O(\log n)$.