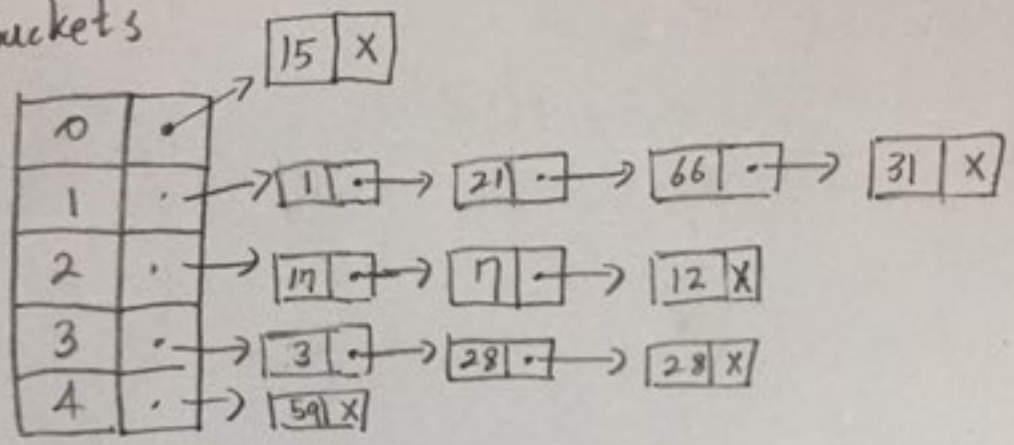
Algorithms Report 2. 20193111188 김주원.

1.

keys	12,	28,	31,	17,	28,	15,	17,	66,	59,	21,	3,	1.
h(k) = k mod 5	2	3	1	2	3	0	2	1	4	1	3	1

keys buckets

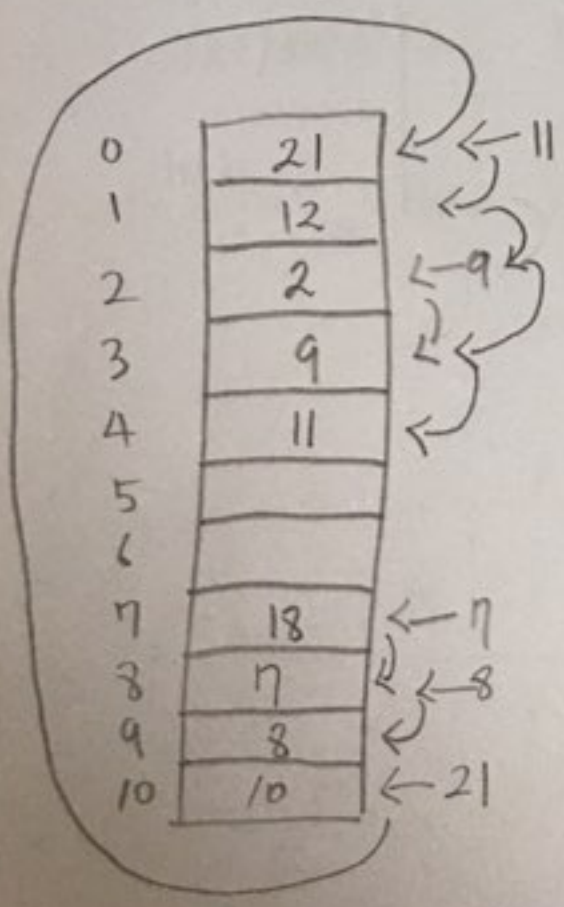


2.

keys	2	18	9	7	12	10	21	11	8
h'(k) = k mod m	2	7	2	7	1	10	10	0	8.

m=11

a). Using linear probing with $h(k,i) = (h'(k)+i) \bmod m$

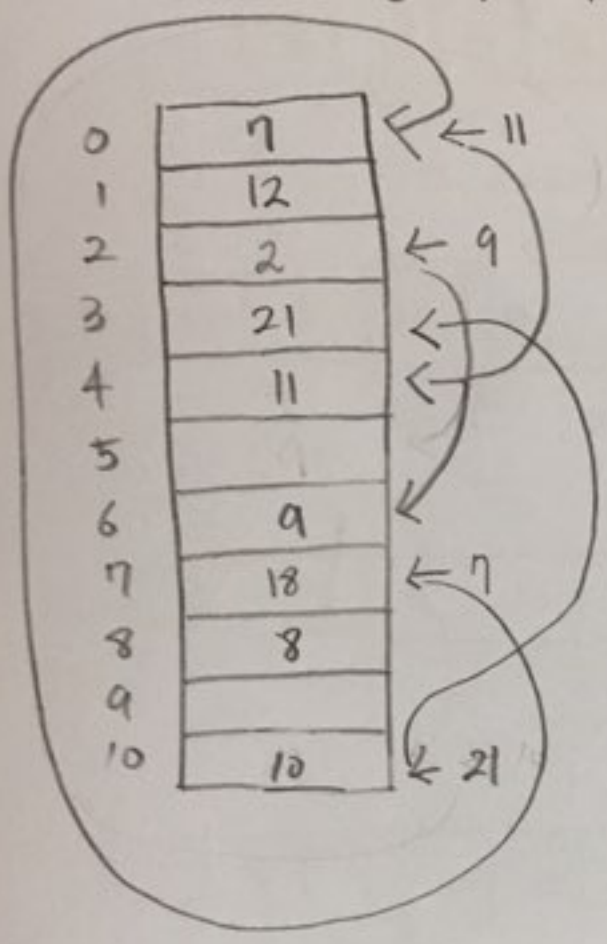


h'(k) → m-1 까지 1칸씩 조사 ↑

0 → h'(k)-1 까지 1칸씩 조사.

b). $h(k,i) = (h'(k) + c_1 i + c_2 i^2) \bmod m$, $c_1 = 1$, $c_2 = 3$, $m = 11$

$= (h'(k) + i + 3i^2) \bmod 11$.



$h(9,1) = (h'(9) + 4) \bmod 11$

$= 6 \bmod 11$

$= 6$

$h(7,1) = (h'(7) + 4) \bmod 11$

$= (7 + 4) \bmod 11$

$= 0$

$h(21,1) = (h'(21) + 4) \bmod 11$

$= 14 \bmod 11$

$= 3$

$h(11,1) = (h'(11) + 4) \bmod 11$

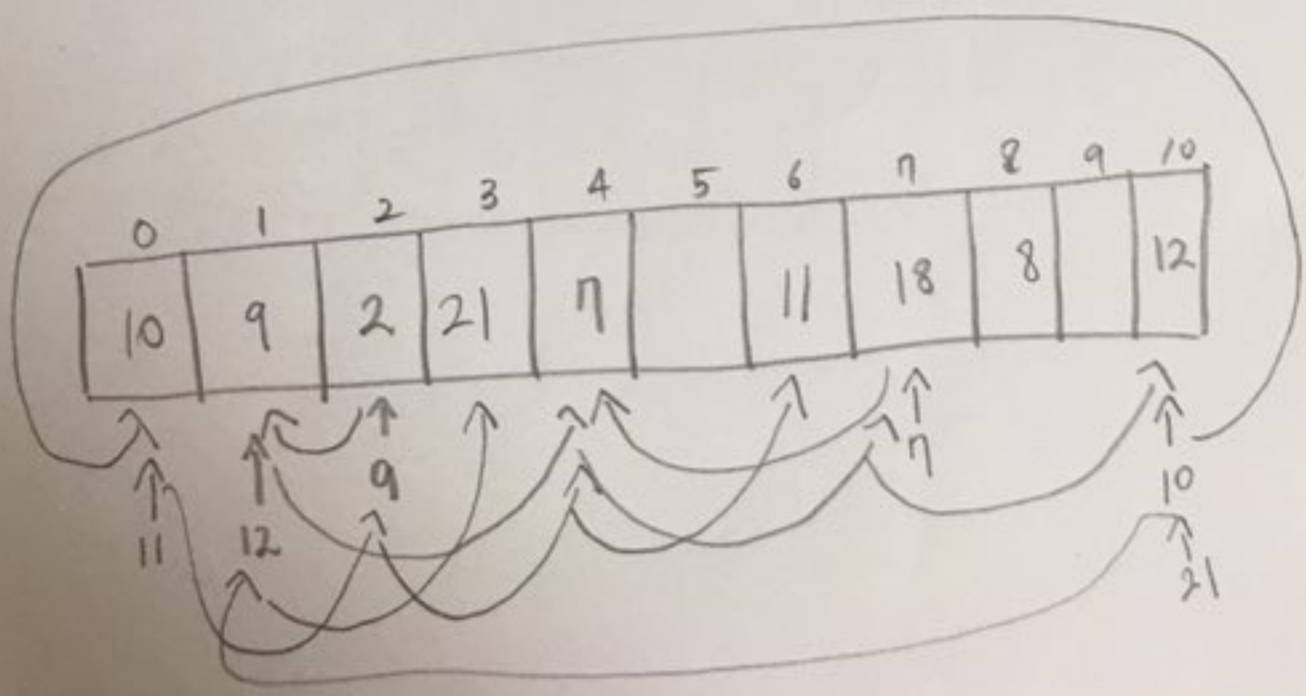
$= (0 + 4) \bmod 11.$

$= 4.$

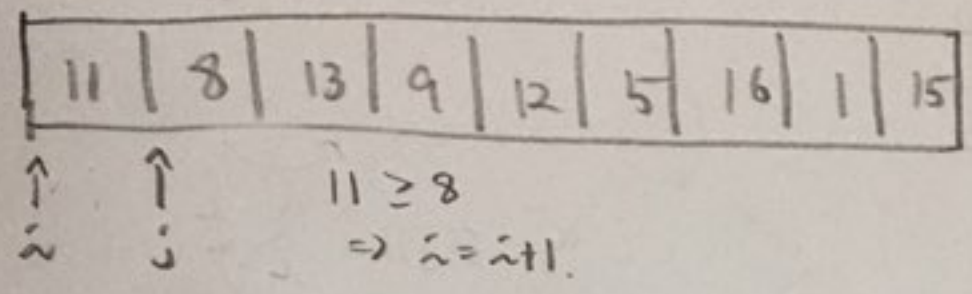
c).

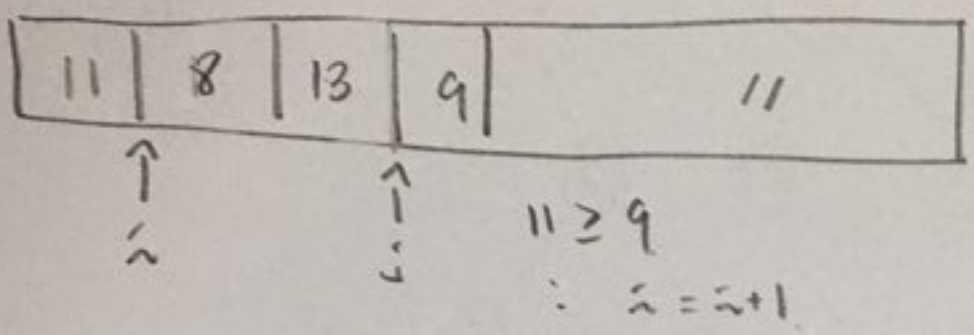
keys	2	18	9	7	12	10	21	11	8
$h_2(k) = 1 + (k \bmod 10)$	3	9	10	8	3	1	2	2	9

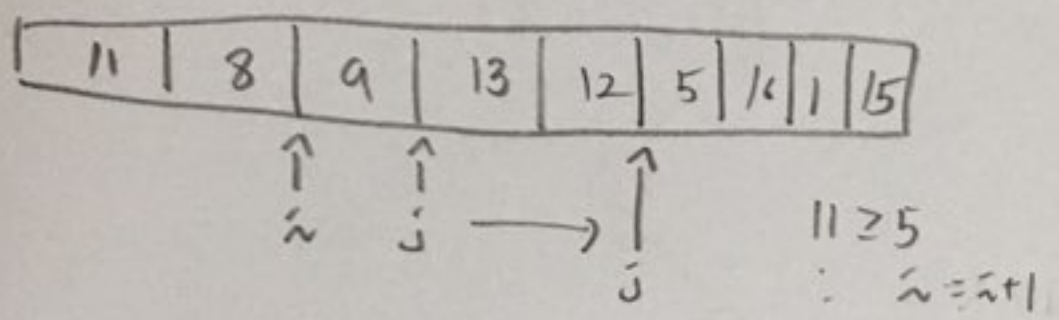
$h(k,i) = (h'(k) + i\,h_2(k)) \bmod 11$. : 처음에 $T[h'(k)]$를 탐색하고, 충돌이 발생하면 $h_2(k)$ 만큼 이동한다.

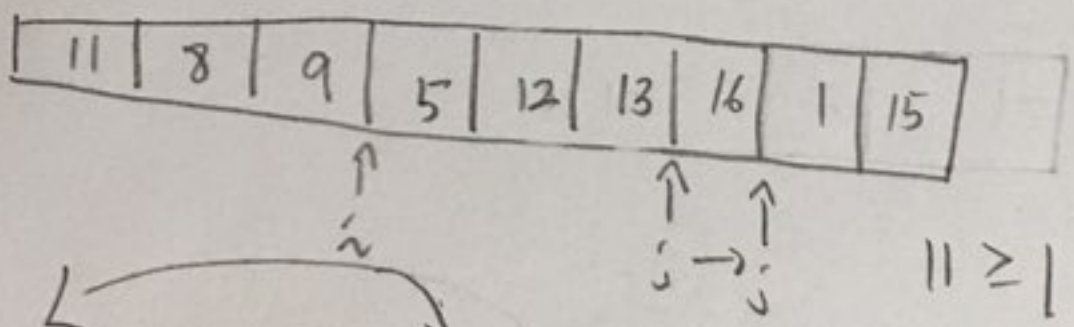


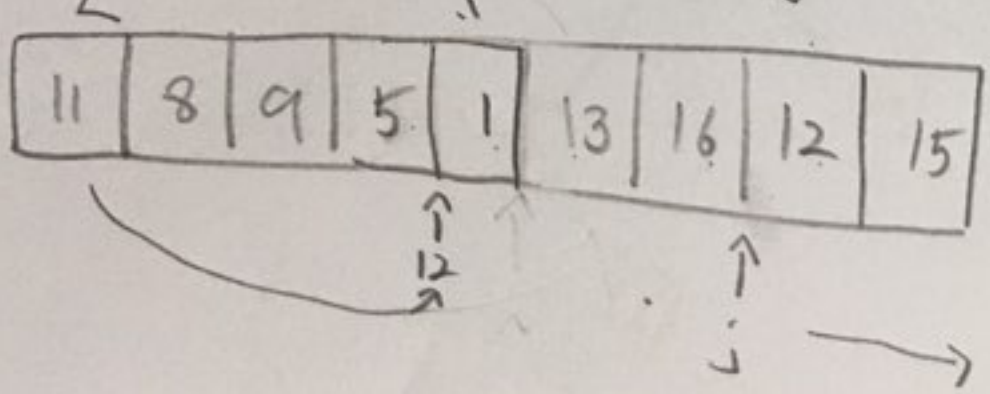
3. $A = \langle 11, 8, 13, 9, 12, 5, 16, 1, 15 \rangle$

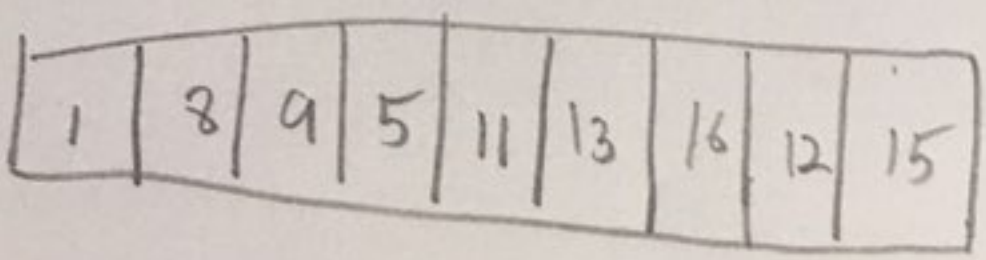








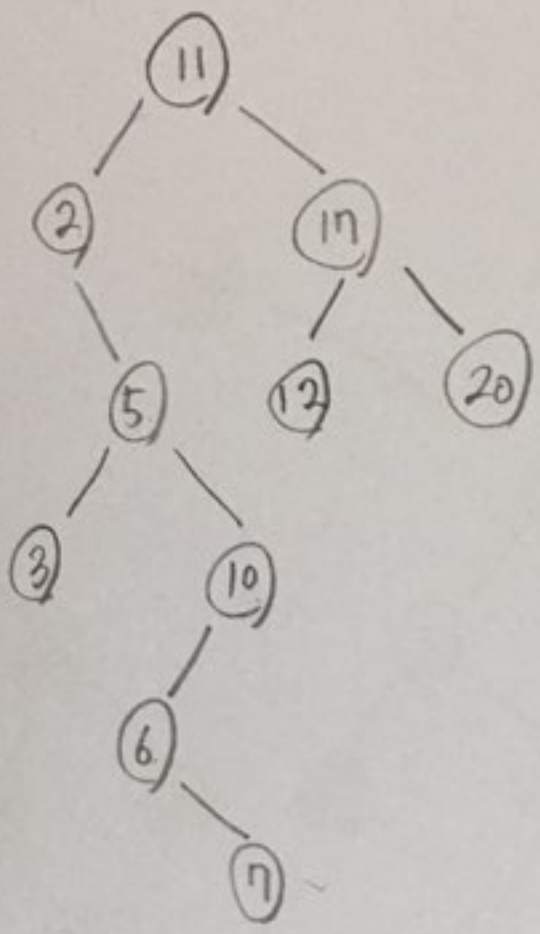




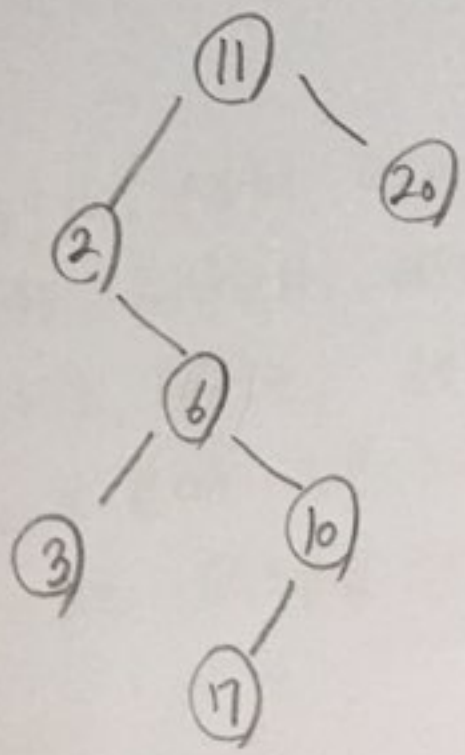
4. keys

11, 2, 17, 5, 3, 10, 6, 7, 12, 20

(a)



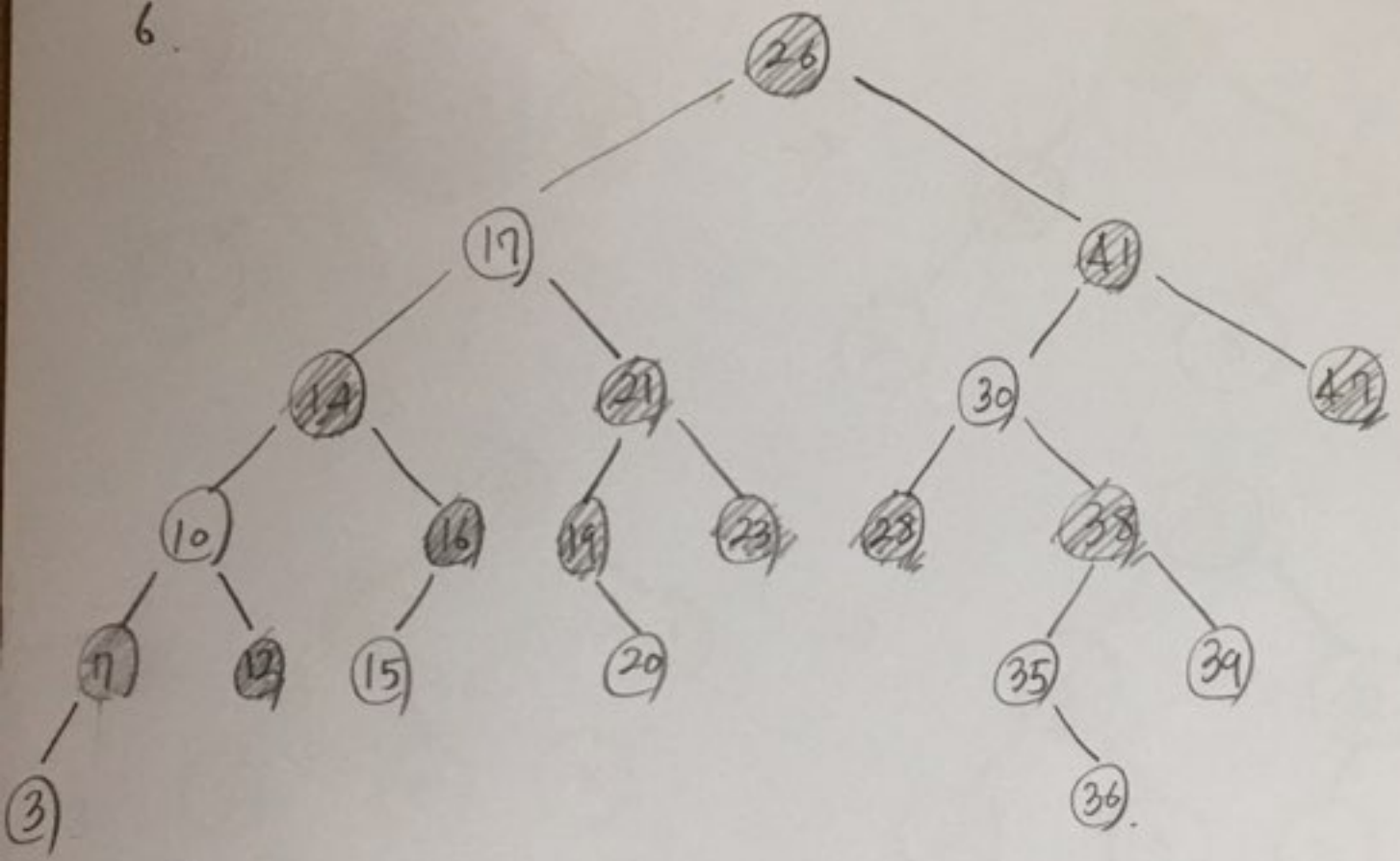
(b)



5 TREE-MAXIMUM(x)

1. while x.right ≠ NIL
2. x = x.right
3. return x

6.

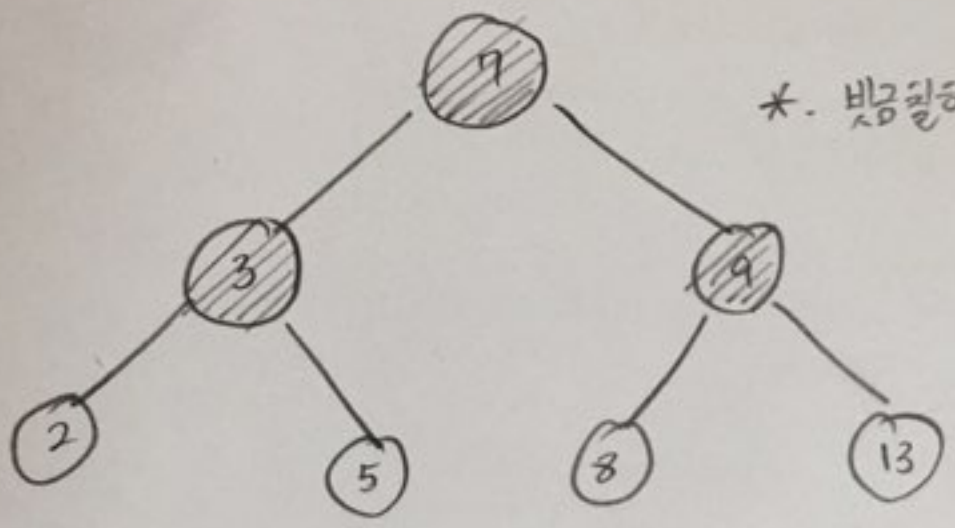


① 만약 삽입된 노드가 적색이면, 연속된 적색 노드가 나오게 되므로 레드블랙 특성 4를 위반한다. 그러므로 레드블랙 트리가 아니다.

② 만약 삽입된 노드가 흑색이면, 38-35-36-T.nil로 갈때 흑색 노드가 2개, 37-39-T.nil로 갈때 흑색 노드가 1개 나온다. 이는 레드블랙 특성 5를 위반한다. 그러므로 레드블랙 트리가 아니다.

7.

insert		Color changes,	left rotations,	Right rotations.	sum three operations.
	7	0	0	0	0
	5	0	0	0	0
	9	0	0	0	0
	2	4	0	0	4
	8	0	0	0	0
	3	2	1	1	4
	13	0	0	0	0

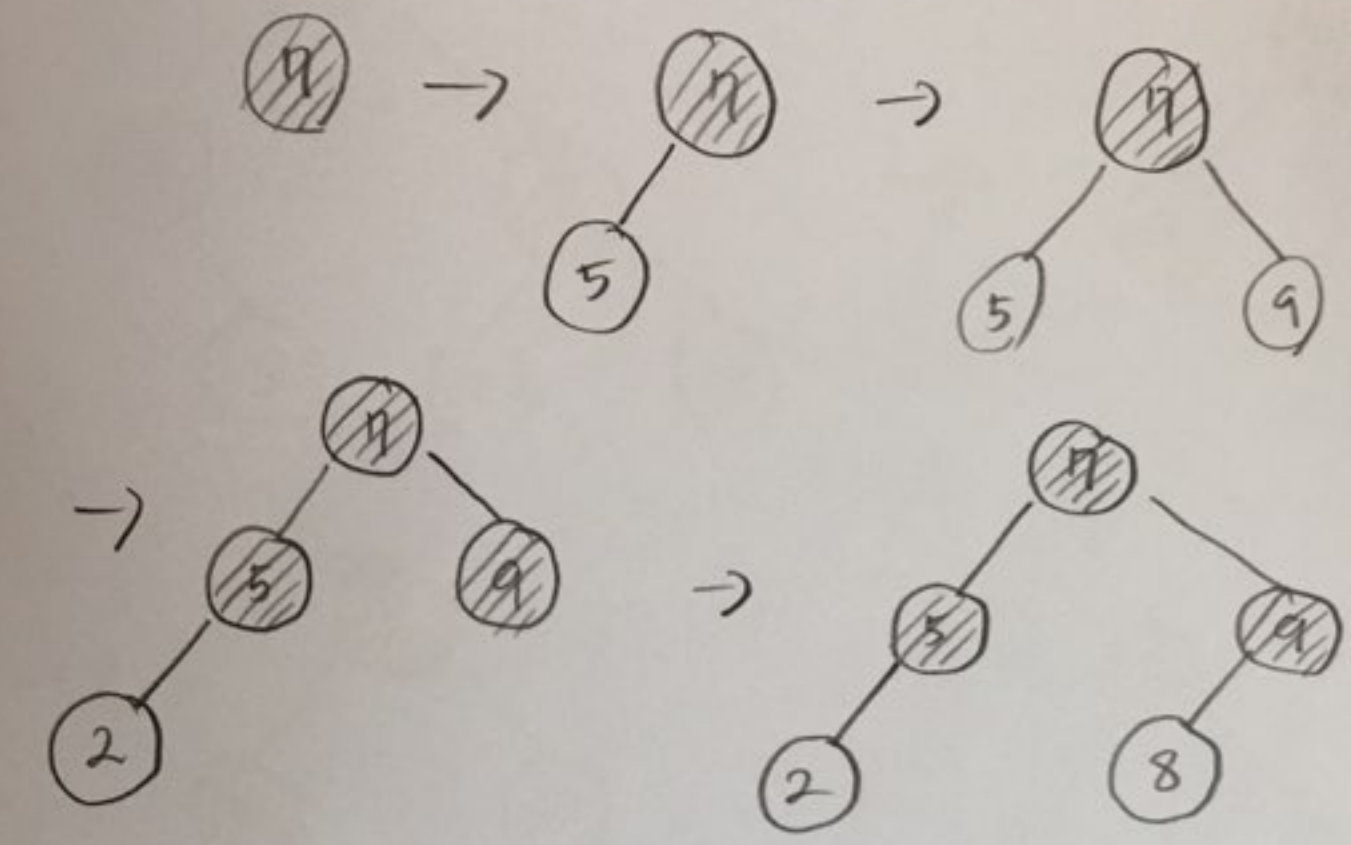


*. 빗금친 것이 블랙.

8.

Delete		Color change,	left rotations	Right rotations	sum three operations
	2	0	0	0	0
	7	1	0	0	1
	9	1	0	0	1
	5	1	1	0	2
	3	1	0	0	1
	13	0	0	0	0
	8	0	0	0	0

7.



8.