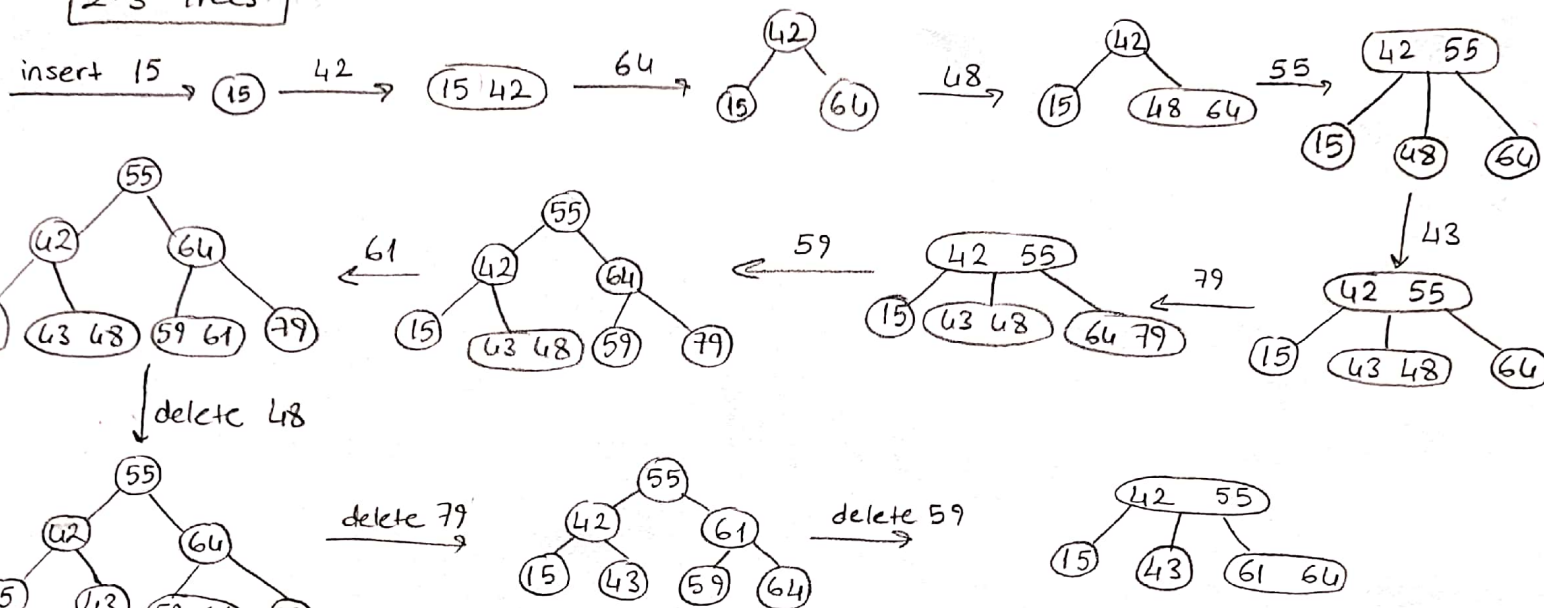
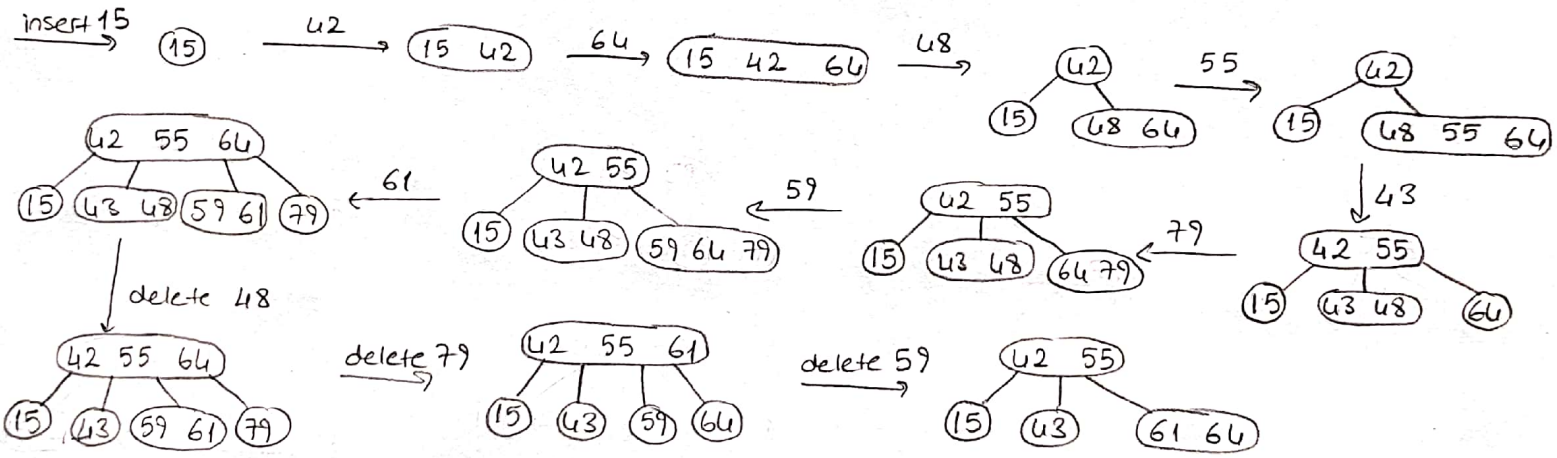
Ayda Yurtoğlu 21903153

Question 1 :

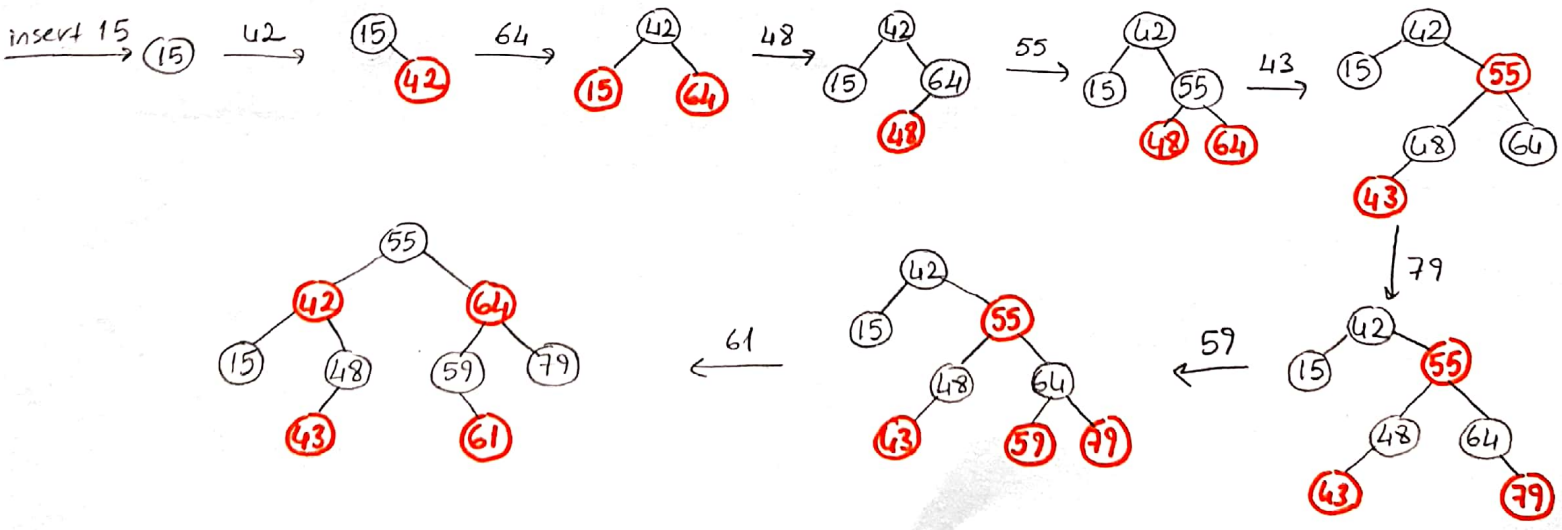
2-3 Trees



2-3-4 Trees



Red-black Trees



Question 2: Table size = 17

Open addressing with linear probing

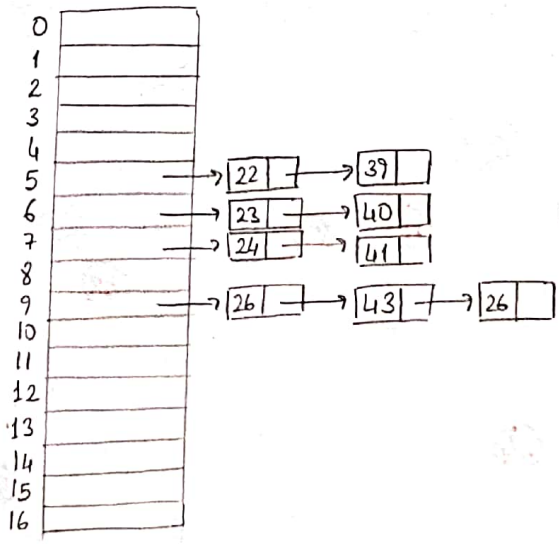
22 mod 17 = 5
23 mod 17 = 6
26 mod 17 = 7
39 mod 17 = ~~5~~ ~~6~~ ~~7~~ 8
40 mod 17 = ~~6~~ ~~7~~ ~~8~~ 9
26 mod 17 = ~~9~~ 10
41 mod 17 = ~~7~~ ~~8~~ ~~9~~ ~~10~~ 11
43 mod 17 = ~~9~~ ~~10~~ ~~11~~ 12
26 mod 17 = ~~9~~ ~~10~~ ~~11~~ ~~12~~ 13

0	
1	
2	
3	
4	
5	22
6	23
7	24
8	39
9	40
10	26
11	41
12	43
13	26
14	
15	
16	

Open addressing with quadratic probing

22 mod 17 = 5
23 mod 17 = 6
26 mod 17 = 7
39 mod 17 = ~~5~~ $\Rightarrow 5+1^2 = 6$ $\Rightarrow 5+2^2 = 9$
40 mod 17 = ~~6~~ $\Rightarrow 6+1^2 = 7$ $\Rightarrow 6+2^2 = 10$
26 mod 17 = ~~9~~ $\Rightarrow 9+1^2 = 10$ $\Rightarrow 9+2^2 = 13$
41 mod 17 = ~~7~~ $\Rightarrow 7+1^2 = 8$
43 mod 17 = ~~9~~ $\Rightarrow 9+1^2 = 10$ $\Rightarrow 9+2^2 = 13$ $\Rightarrow 9+3^2 = 18$
$\Rightarrow 18 \bmod 17 = 1$
26 mod 17 = ~~9~~ $\Rightarrow 9+1^2 = 10$ $\Rightarrow 9+2^2 = 13$ $= 9+3^2 = 18$
$\Rightarrow 9+4^2 = 25$
$\Rightarrow 25 \bmod 17 = 8$
$\Rightarrow 9+5^2 = 34$

0	26
1	43
2	
3	
4	
5	22
6	23
7	24
8	41
9	39
10	40
11	
12	
13	26
14	
15	
16	

Separate Chaining

22 mod 17 = 5
23 mod 17 = 6
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39 mod 17 = 5
40 mod 17 = 6
26 mod 17 = 9
41 mod 17 = 7
43 mod 17 = 9
26 mod 17 = 9