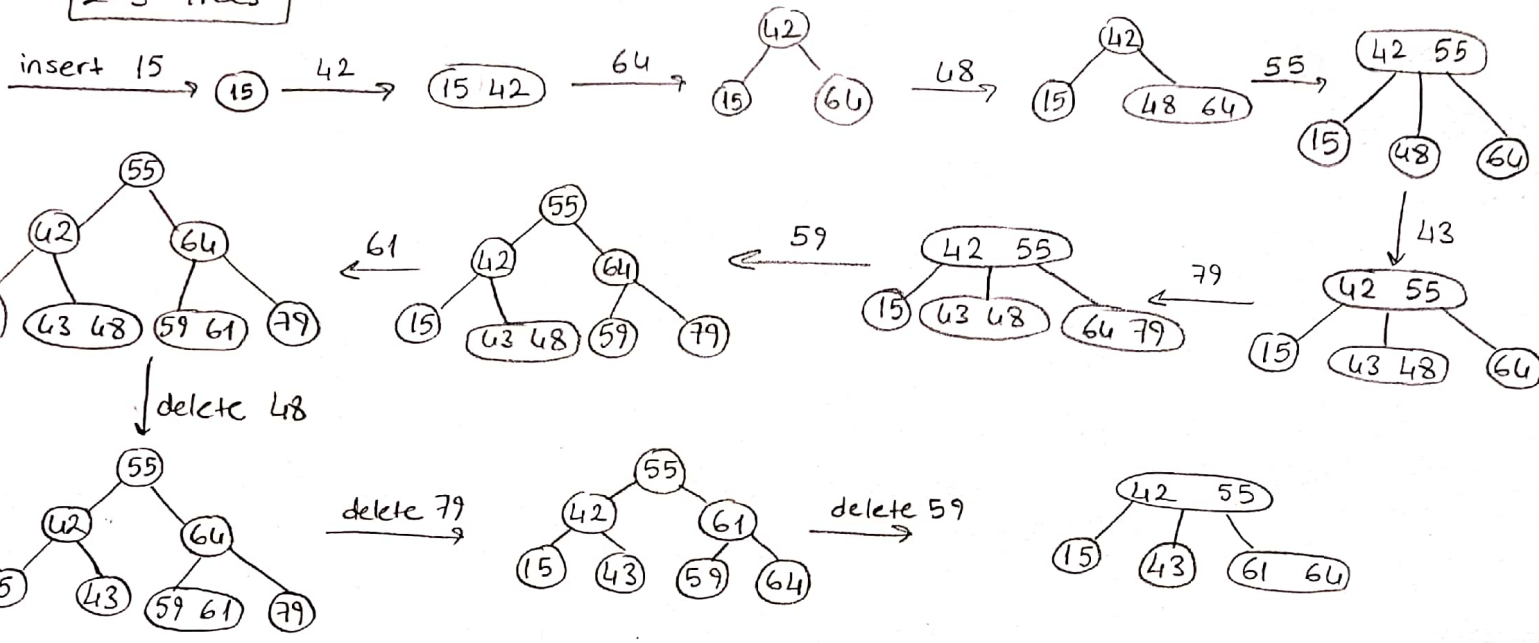
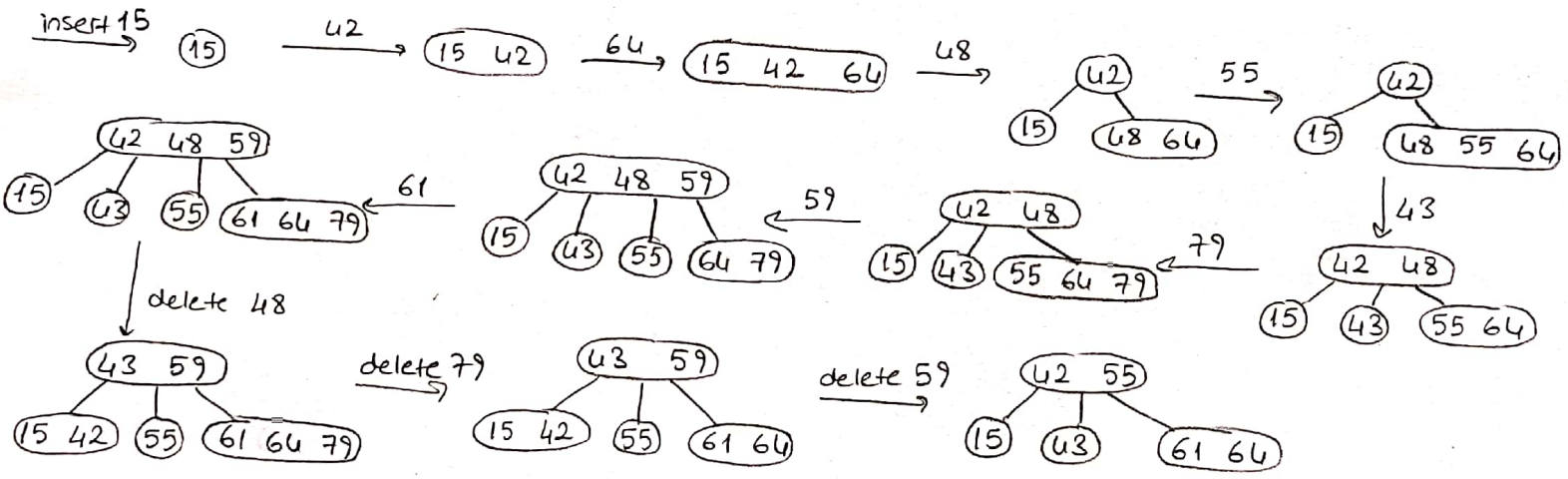
Ayda Yurtoğlu 21903153

Question 1:

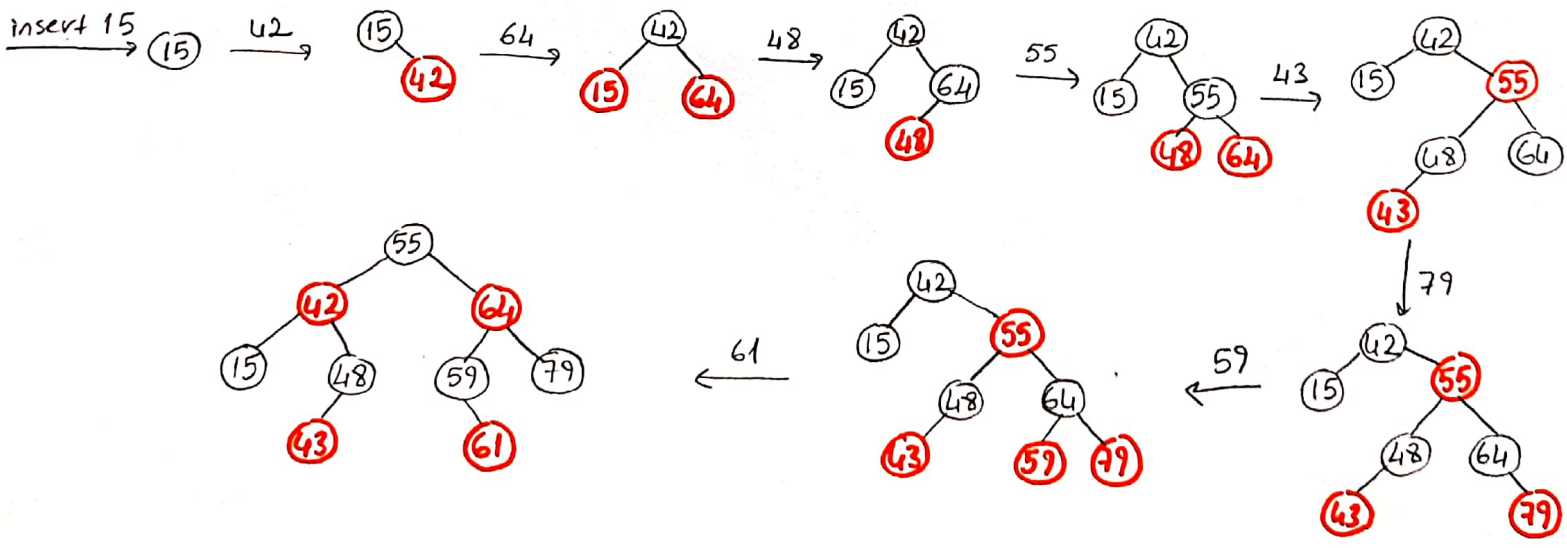
2-3 Trees



2-3-4 Trees



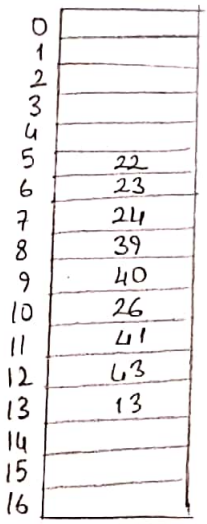
Red-black Trees



Question 2: Table size = 17

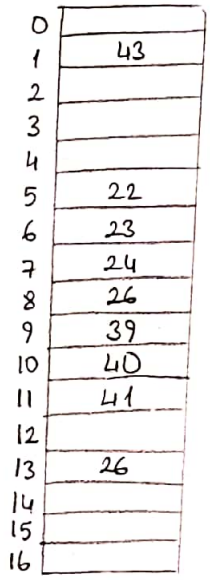
Open addressing with linear probing

22 mod 17 = 5
23 mod 17 = 6
24 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



Open addressing with quadratic probing

22 mod 17 = 5
23 mod 17 = 6
24 mod 17 = 7
39 mod 17 = ~~5~~ $\Rightarrow 5+1^2 = \cancel{6} \Rightarrow 5+2^2 = 9$
40 mod 17 = ~~6~~ $\Rightarrow 6+1^2 = \cancel{7} \Rightarrow 6+2^2 = 10$
26 mod 17 = ~~9~~ $\Rightarrow 9+1^2 = \cancel{10} \Rightarrow 9+2^2 = 13$
41 mod 17 = ~~7~~ $\Rightarrow 7+1^2 = 8 \Rightarrow 7+2^2 = 11$
43 mod 17 = ~~9~~ $\Rightarrow 9+1^2 = \cancel{10} \Rightarrow 9+2^2 = \cancel{13} \Rightarrow 9+3^2 = 18$
$\Rightarrow 18 \bmod 17 = 1$
26 mod 17 = ~~9~~ $\Rightarrow 9+1^2 = \cancel{10} \Rightarrow 9+2^2 = \cancel{13} = 9+3^2 = \cancel{18}$
$\Rightarrow 9+4^2 = 25$
$\Rightarrow 25 \bmod 17 = 8$



Separate Chaining

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