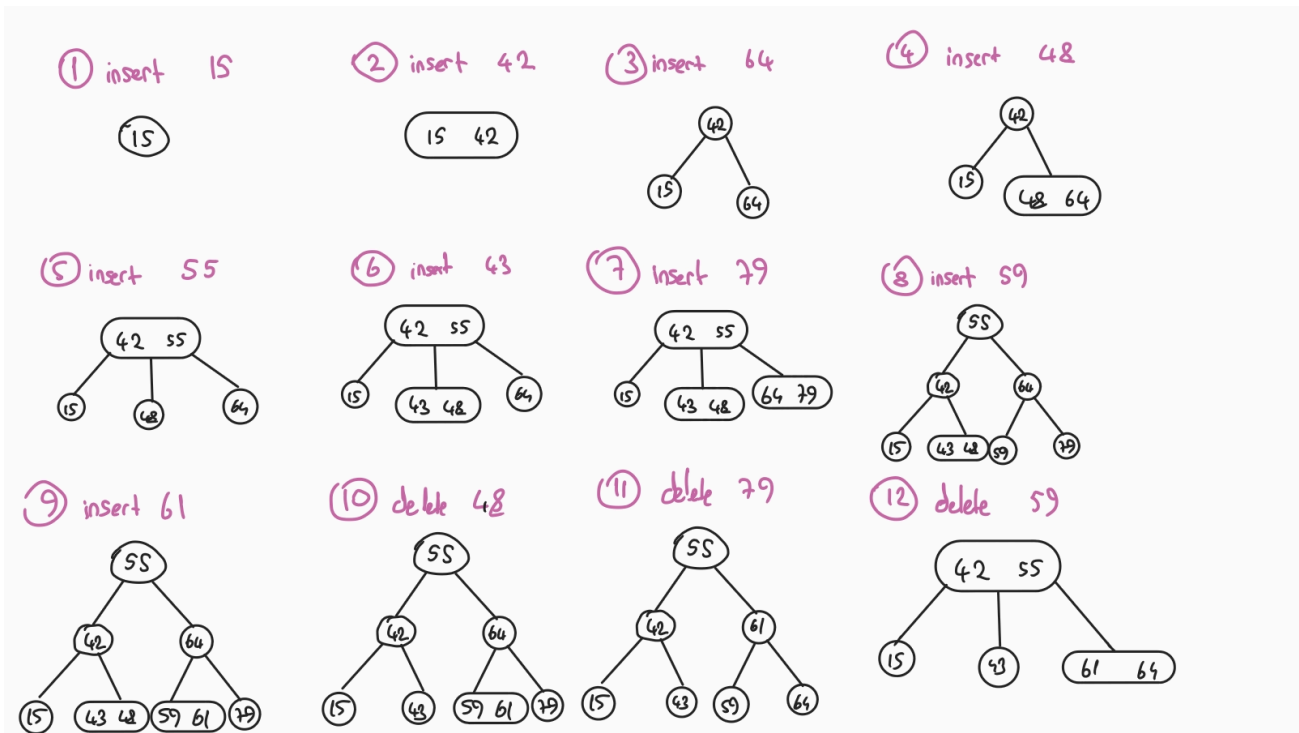




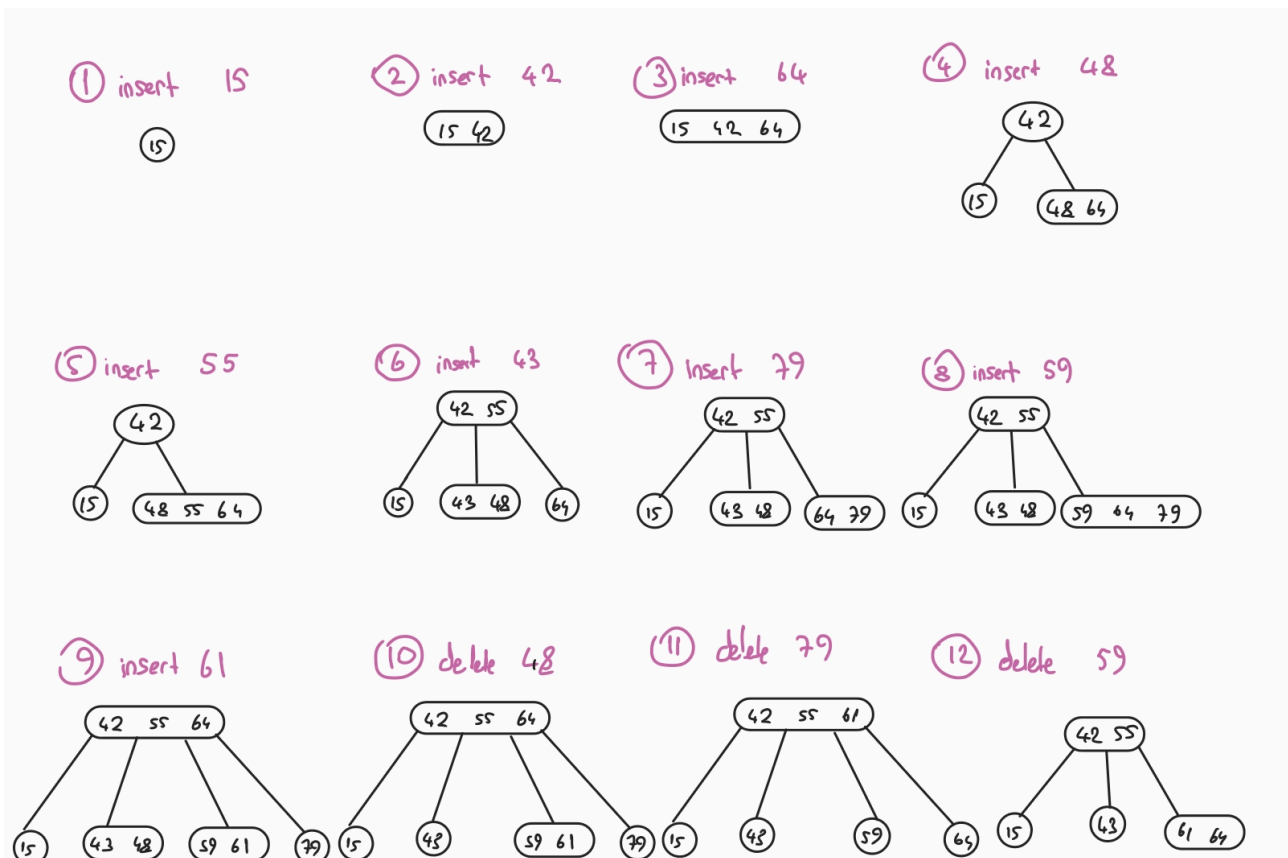
CS202
HOMEWORK 4 REPORT
HACI ÇAKIN
21802641
SECTION 3

Question 1

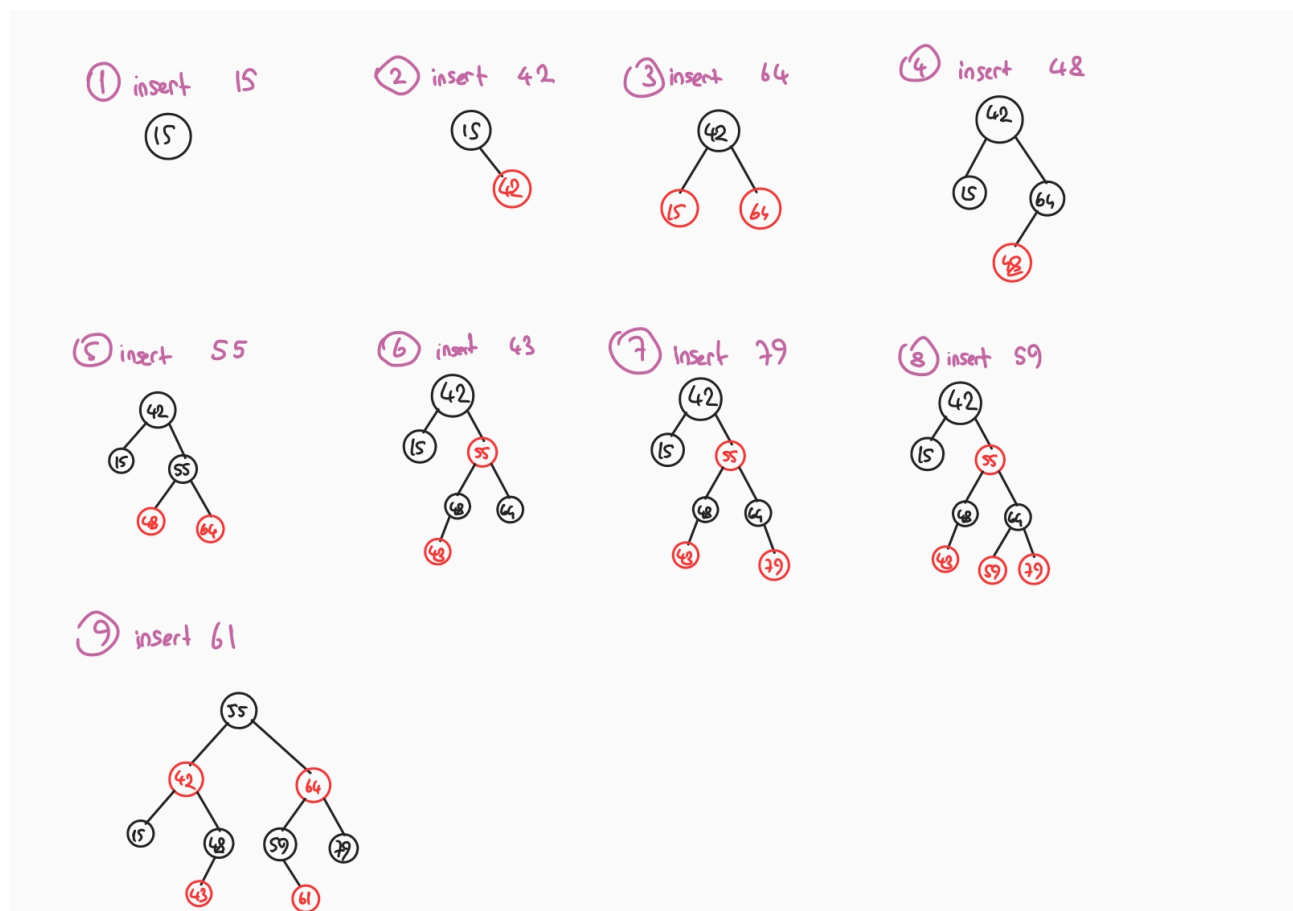
A) 2-3 Tree



B) 2-3-4 Tree



C) Red-Black Tree



Question 2

A) Linear

- ① 22 $\rightarrow \text{mod } 17 \rightarrow 5$
- ② 23 $\rightarrow \text{mod } 17 \rightarrow 6$
- ③ 24 $\rightarrow \text{mod } 17 \rightarrow 7$
- ④ 39 $\rightarrow \text{mod } 17 \rightarrow 5+1 \rightarrow 6+1 \rightarrow 7+1 \rightarrow 8$
- ⑤ 40 $\rightarrow \text{mod } 17 \rightarrow 6+1 \rightarrow 7+1 \rightarrow 8+1 \rightarrow 9$
- ⑥ 26 $\rightarrow \text{mod } 17 \rightarrow 9+1 \rightarrow 10$
- ⑦ 41 $\rightarrow \text{mod } 17 \rightarrow 7+1 \rightarrow 8+1 \rightarrow 9+1 \rightarrow 10+1 \rightarrow 11$
- ⑧ 43 $\rightarrow \text{mod } 17 \rightarrow 9+1 \rightarrow 10+1 \rightarrow 11+1 \rightarrow 12$
- ⑨ 26 $\rightarrow \text{mod } 17 \rightarrow 9+1 \rightarrow 10+1 \rightarrow 11+1 \rightarrow 12+1 \rightarrow 13$

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	

B) Quadratic Probing

- ① 22 $\rightarrow \text{mod } 17 \rightarrow 5$
- ② 23 $\rightarrow \text{mod } 17 \rightarrow 6$
- ③ 24 $\rightarrow \text{mod } 17 \rightarrow 7$
- ④ 39 $\rightarrow \text{mod } 17 \rightarrow 5 + 1^2 \rightarrow 5 + 2^2 = 9$
- ⑤ 40 $\rightarrow \text{mod } 17 \rightarrow 6 + 1^2 \rightarrow 6 + 2^2 = 10$
- ⑥ 26 $\rightarrow \text{mod } 17 \rightarrow 9 + 1^2 \rightarrow 9 + 2^2 = 13$
- ⑦ 41 $\rightarrow \text{mod } 17 \rightarrow 7 + 1^2 = 8$
- ⑧ 43 $\rightarrow \text{mod } 17 \rightarrow 9 + 1^2 \rightarrow 9 + 2^2 \rightarrow 9 + 3^2 \text{ mod } (17) = 1$
- ⑨ 26 $\rightarrow \text{mod } 17 \rightarrow 9 + 1^2 \rightarrow 9 + 2^2 \rightarrow 9 + 3^2 \rightarrow 9 + 4^2 \rightarrow 9 + 5^2 \text{ mod } (17) = 0$

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	

C) Separate Chaining

- ① 22 $\rightarrow \text{mod } 17 \rightarrow 5$
- ② 23 $\rightarrow \text{mod } 17 \rightarrow 6$
- ③ 24 $\rightarrow \text{mod } 17 \rightarrow 7$
- ④ 39 $\rightarrow \text{mod } 17 \rightarrow 5$
- ⑤ 40 $\rightarrow \text{mod } 17 \rightarrow 6$
- ⑥ 26 $\rightarrow \text{mod } 17 \rightarrow 9$
- ⑦ 41 $\rightarrow \text{mod } 17 \rightarrow 7$
- ⑧ 43 $\rightarrow \text{mod } 17 \rightarrow 9$
- ⑨ 26 $\rightarrow \text{mod } 17 \rightarrow 9$

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