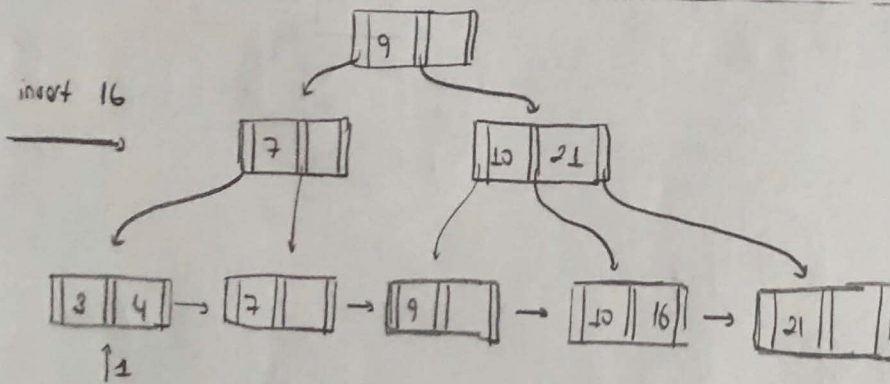
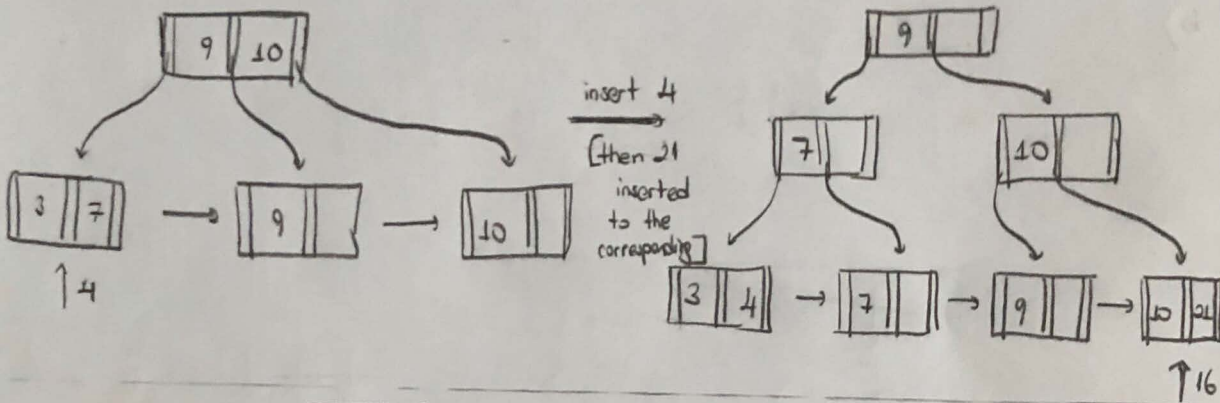
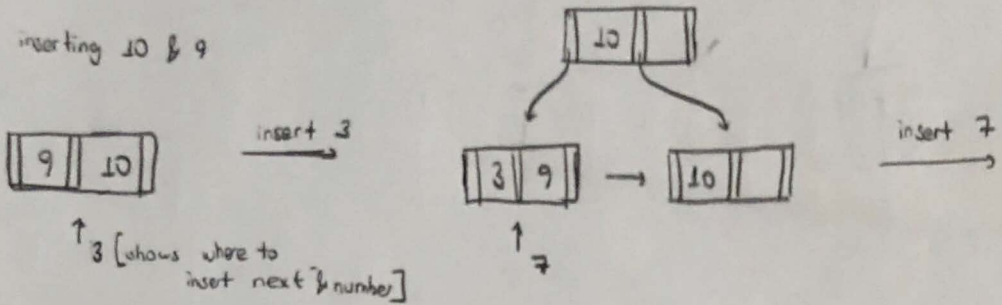


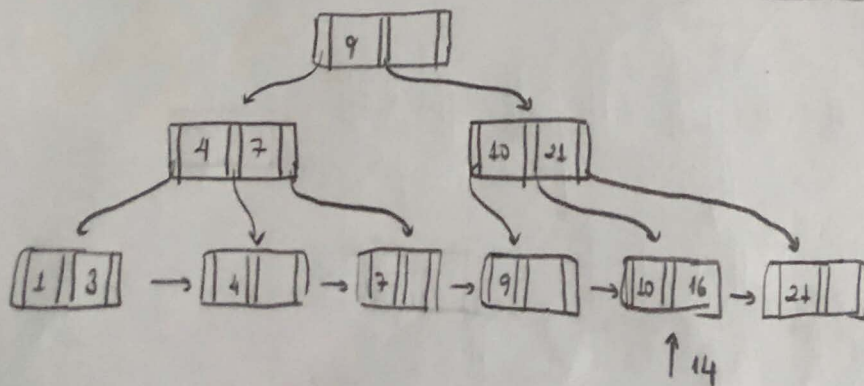
# Question 1

a)

After inserting 10 & 9



insert 1

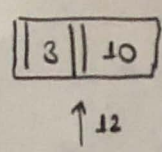


insert 14

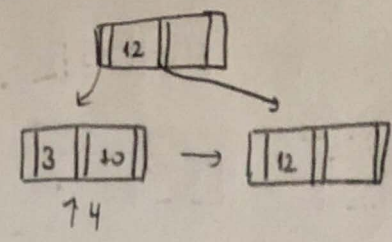




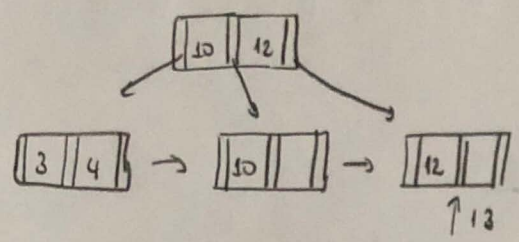
c) After insertion  
3 & 10



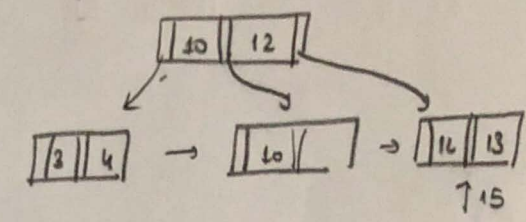
insert 12



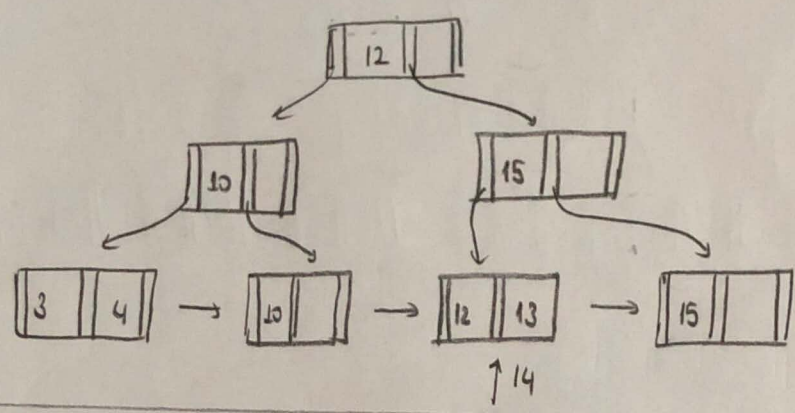
insert 4



insert 13

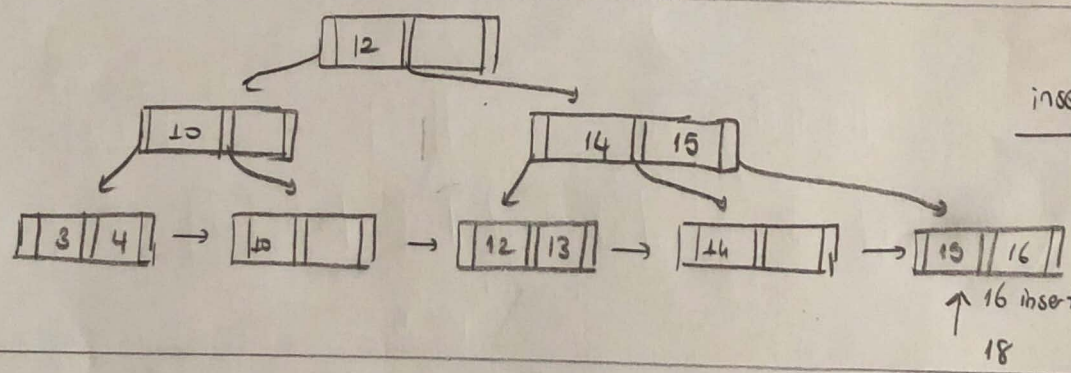


insert 15

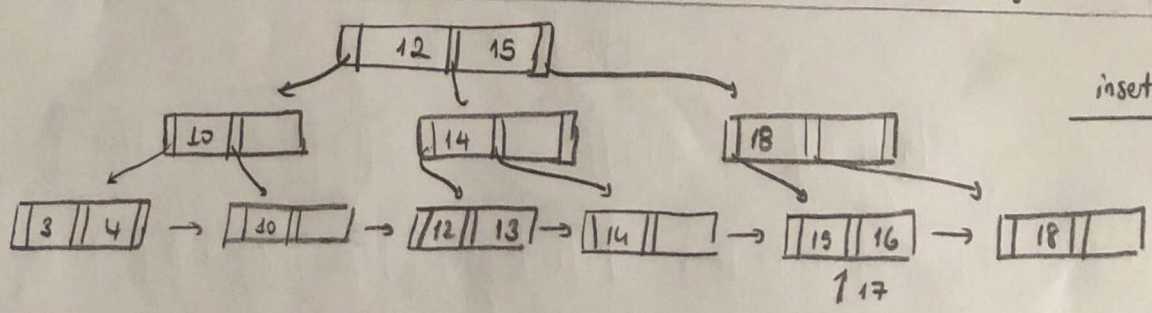


insert 14

[16 also inserted  
since we just put  
in its place  
shown in next  
diagram]

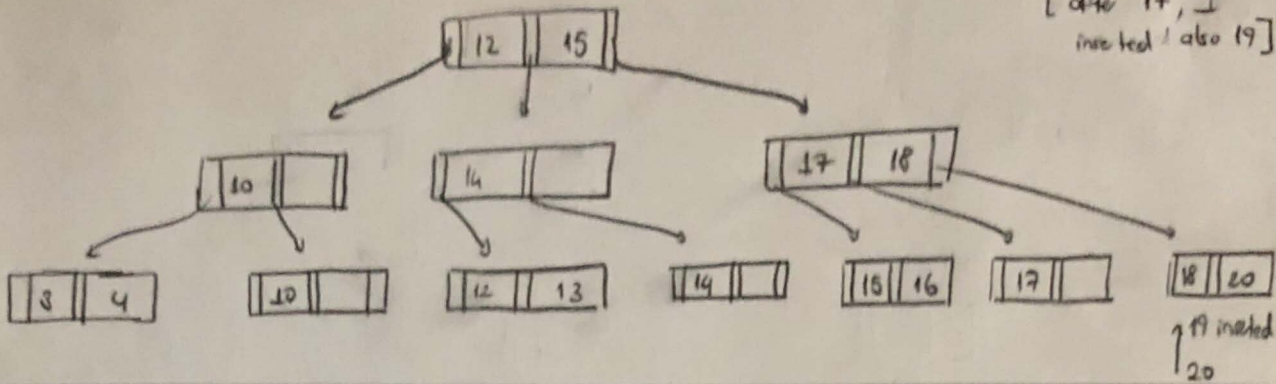


insert 18

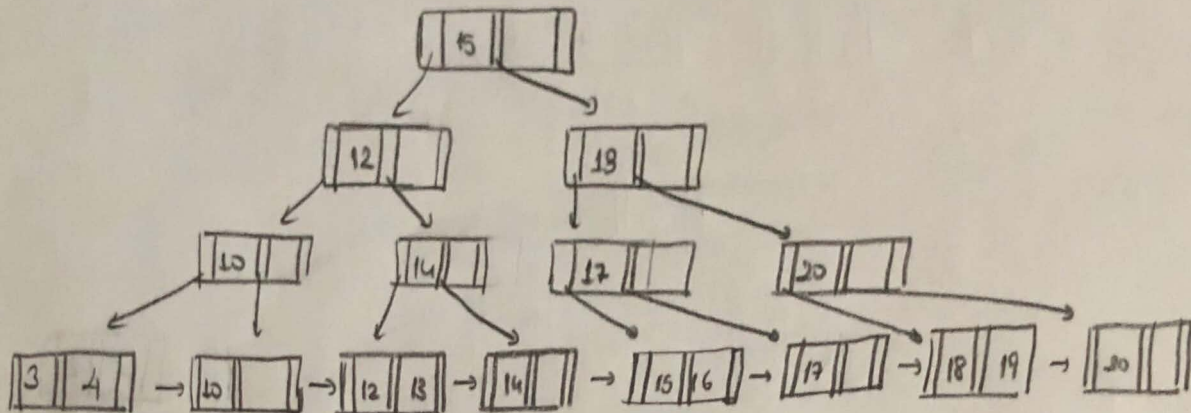


insert 17

[after 17, I  
inserted also 19]

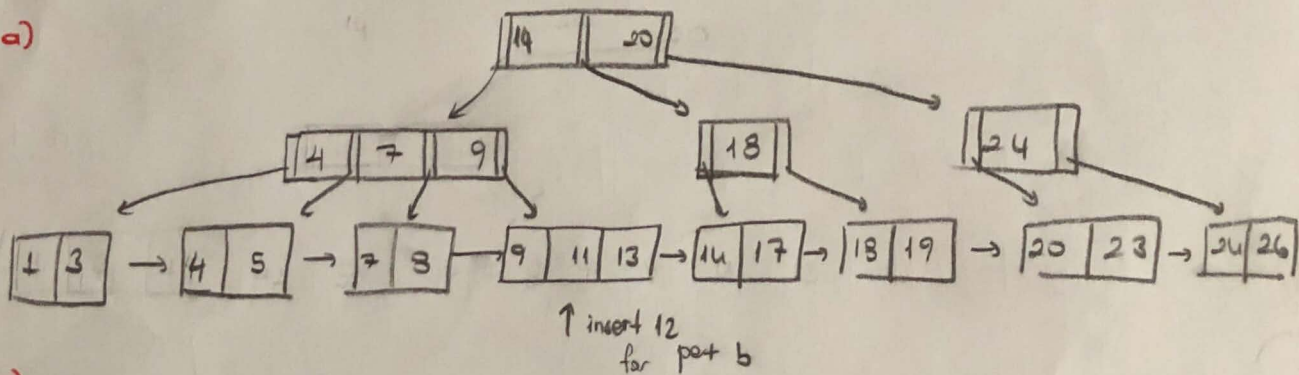


insert 20

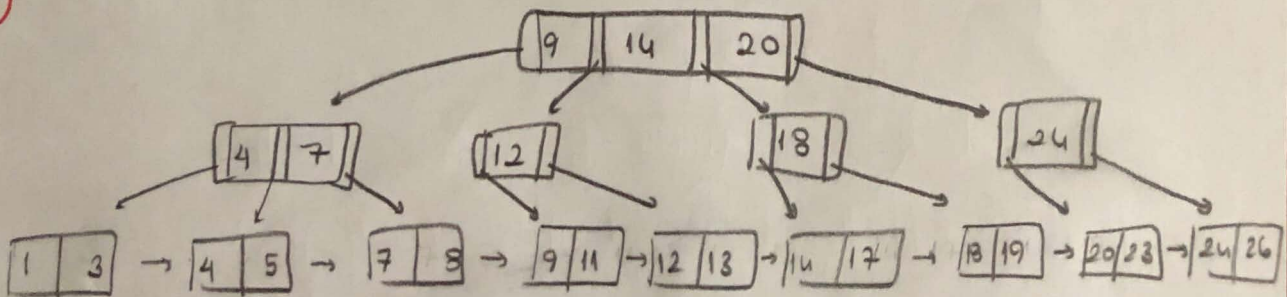


Question 2)

a)

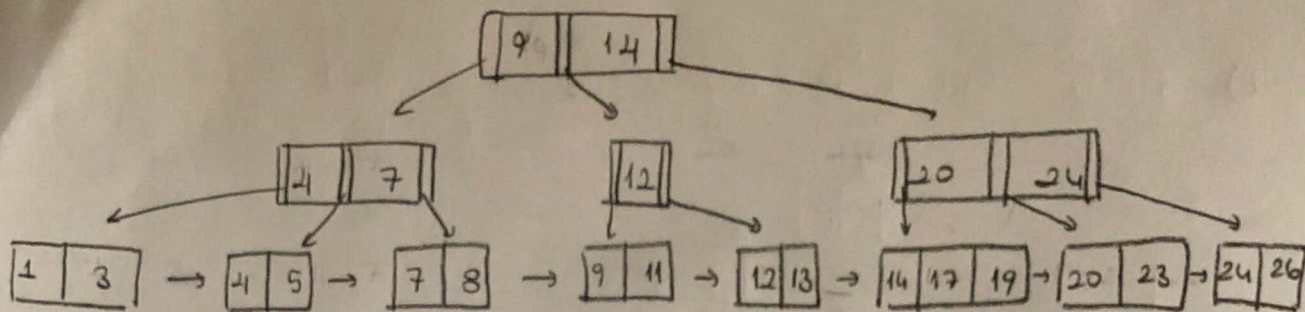


b)

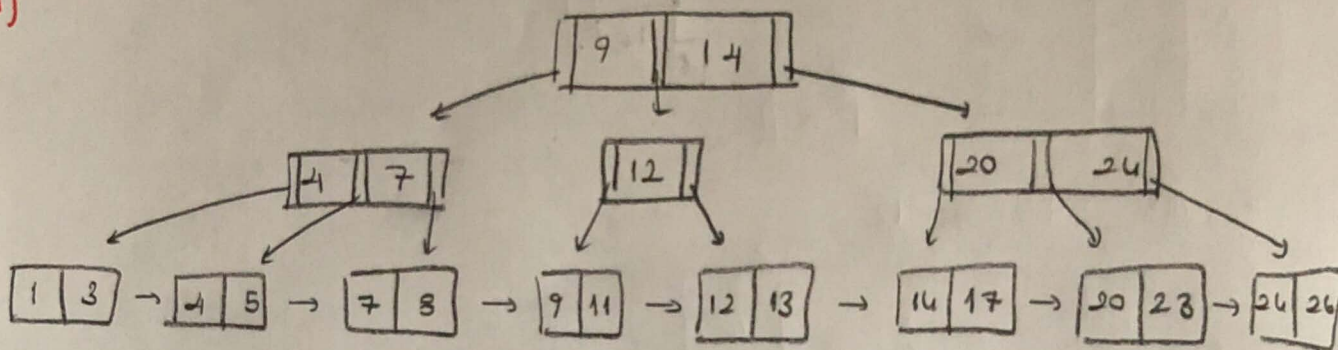




c)



d)



### Question 3

$$15 = \overline{1111}$$

$$22 = \overline{10110}$$

$$10 = \overline{1010}$$

$$20 = \overline{10100}$$

$$9 = \overline{1001}$$

$$4 = \overline{100}$$

$$12 = \overline{1100}$$

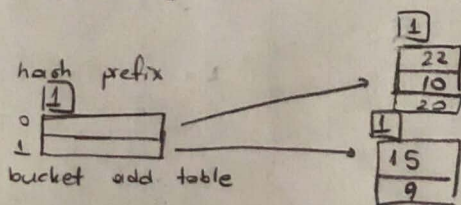
$$8 = \overline{1000}$$

$$16 = \overline{10000}$$

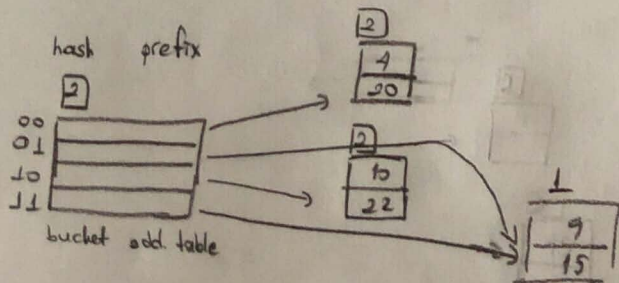
$$18 = \overline{101010}$$

$$14 = \overline{1110}$$

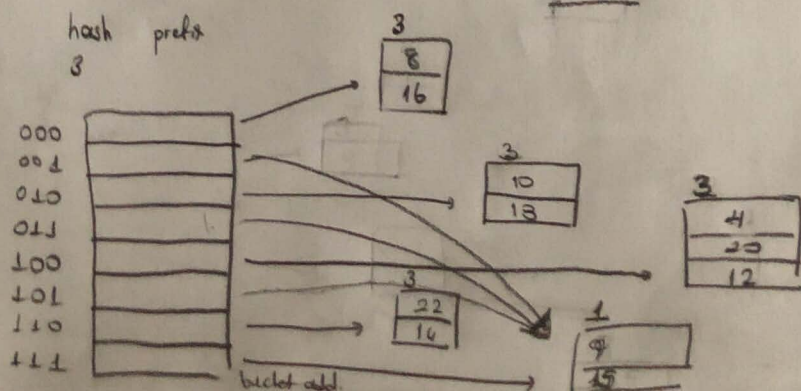
a)



[After insertion 15 / 22 / 10 / 20 / 9]

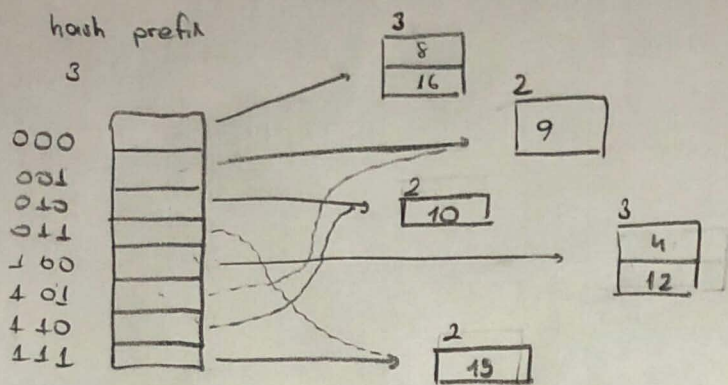


[After insertion 4 / 12 / 10]



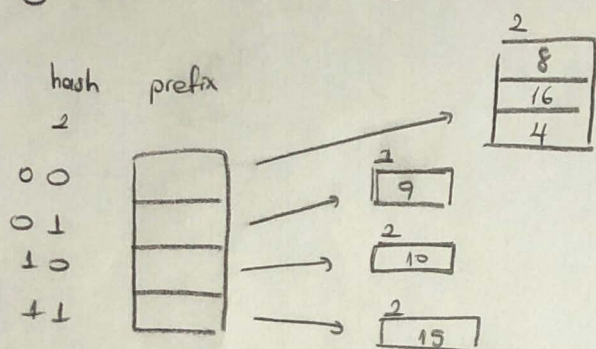
[After insertion 8 / 16 / 18 / 14]

b) ④ After deletion 18 / 14 / 22 / 20 →



Intermediate steps did not shown. Because we are just deleting these numbers from hash table without changing the size of the bucket address table. At the shown steps we needed to shrink this table.

④ After deletion 12



④ After deletion 4 / 10

