Jaron Jon Javier
Professor Ahmad Hadaegh
CS443 - Database Management Systems
6 December, 2023

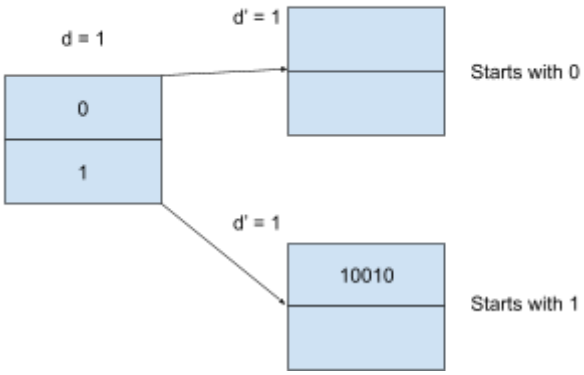
Lab 5

Question 1:

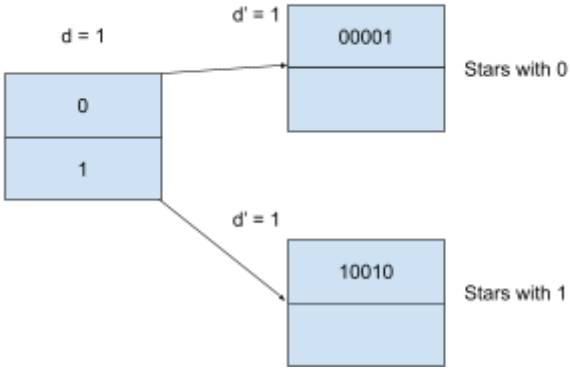
Use extended hashing technique to insert the employees in which their corresponding binary Empl_IDs are shown below. Assume you can have two employees per block. Show the depth of both global and local directories. The bits should be considered from left to right.

10010, 00001,10000, 00111, 11101, 10100, 11011, 10101, 01111

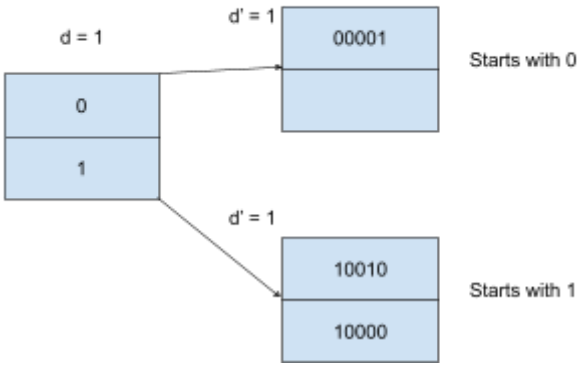
Inserting 10010



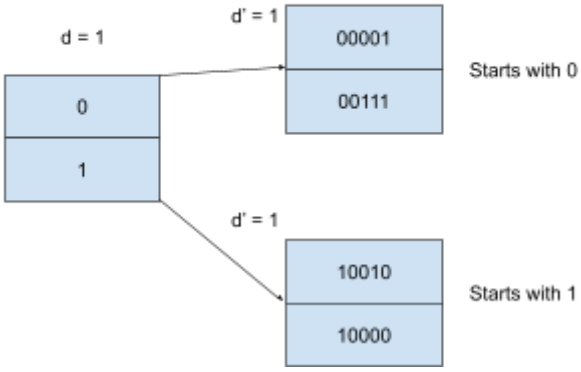
Inserting 00001

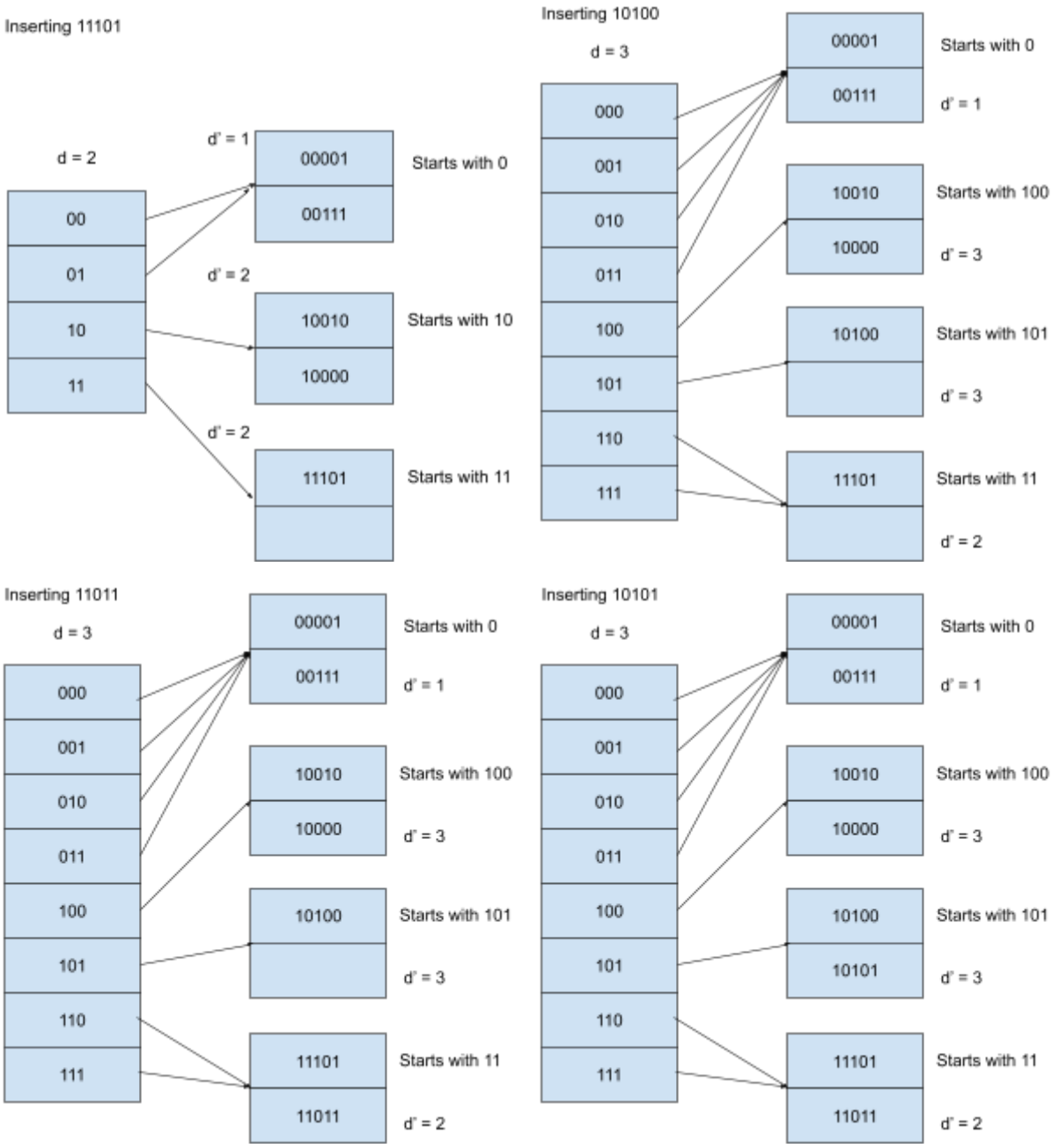


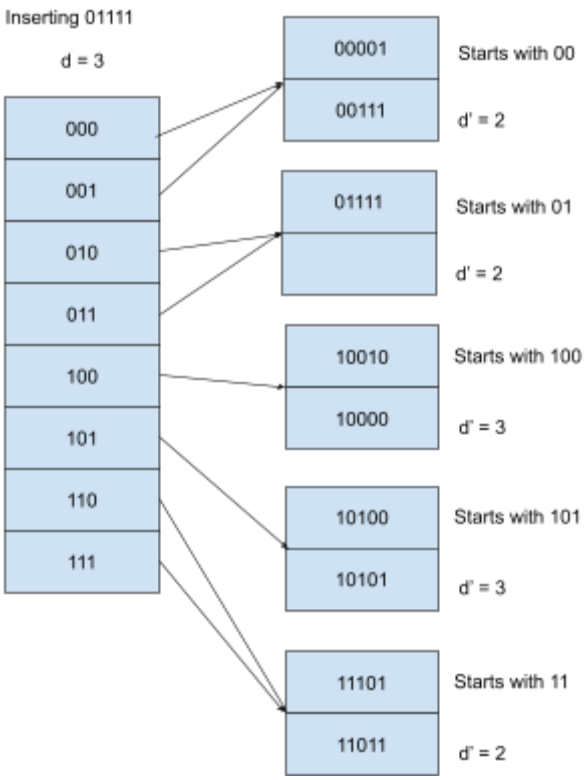
Inserting 10000



Inserting 00111




Inserting 11101
d = 2
00
01
10
11
d' = 1
00001
00111
Starts with 0
d' = 2
10010
10000
Starts with 10
d' = 2
11101
Starts with 11
Inserting 10100
d = 3
000
001
010
011
100
101
110
111
00001
00111
Starts with 0
d' = 1
10010
10000
Starts with 100
d' = 3
10100
Starts with 101
d' = 3
11101
Starts with 11
d' = 2
Inserting 11011
d = 3
000
001
010
011
100
101
110
111
00001
00111
Starts with 0
d' = 1
10010
10000
Starts with 100
d' = 3
10100
Starts with 101
d' = 3
11101
11011
Starts with 11
d' = 2
Inserting 10101
d = 3
000
001
010
011
100
101
110
111
00001
00111
Starts with 0
d' = 1
10010
10000
Starts with 100
d' = 3
10100
10101
Starts with 101
d' = 3
11101
11011
Starts with 11
d' = 2

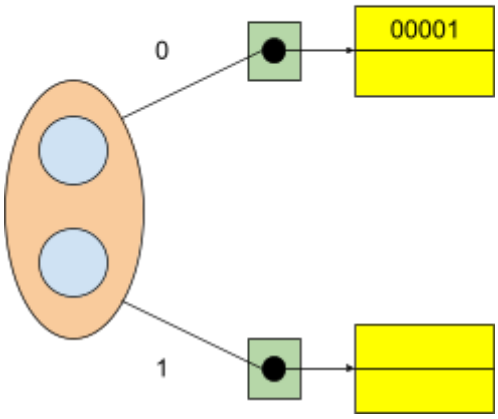

Inserting 01111
d = 3
000
001
010
011
100
101
110
111
00001
00111
Starts with 00
d' = 2
01111
Starts with 01
d' = 2
10010
10000
Starts with 100
d' = 3
10100
10101
Starts with 101
d' = 3
11101
11011
Starts with 11
d' = 2

Question 2:
Consider the following records: (Again Digits should be considered from left to right)

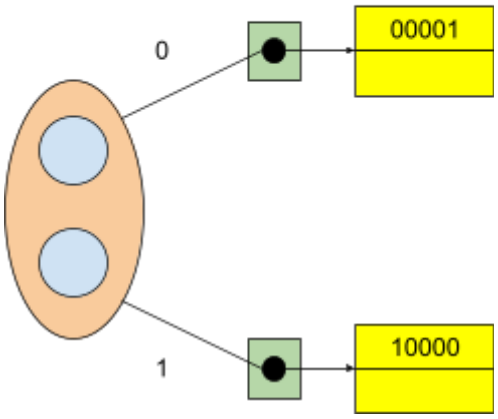
00001, 10000, 10100, 00111, 11011, 11101, 10010, 01111, 10101

Load the records into files using Dynamic Hashing Scheme. You can put two records per block. Show the directory at each step, and the global and local depths.

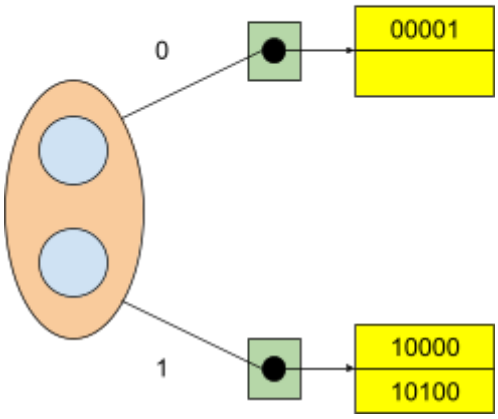
Inserting 00001



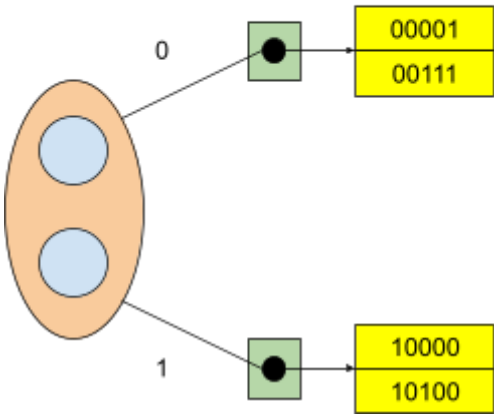
Inserting 10000



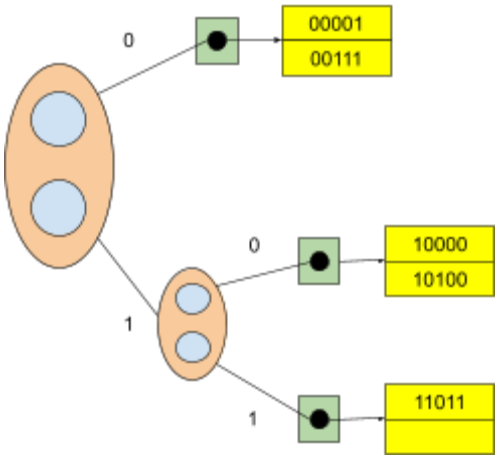
Inserting 10100



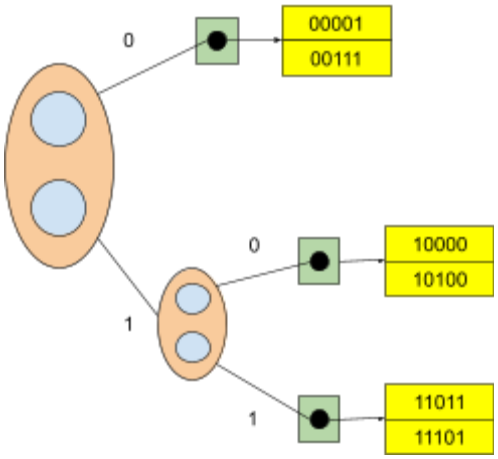
Inserting 00111



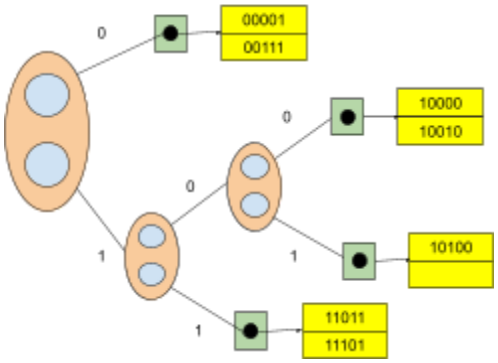
Inserting 11011



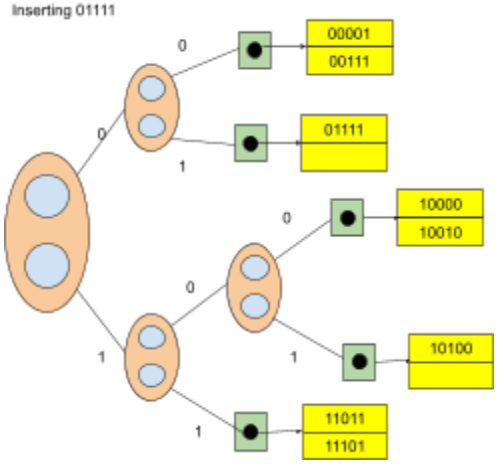
Inserting 11101



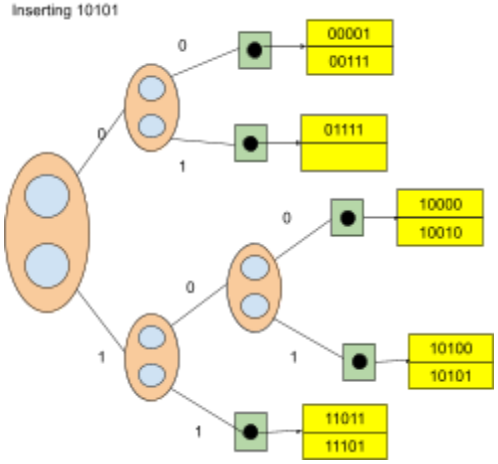
Inserting 10010



Inserting 01111



Inserting 10101



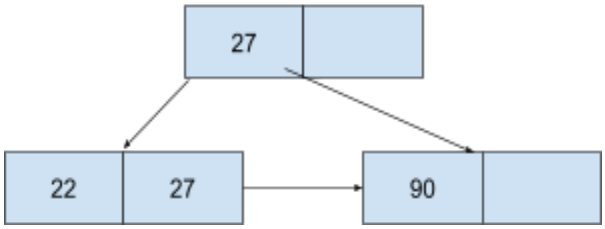
Question 3:
Insert the following into B+ tree of order 3. Show your work step by step with proper illustration of pointers as shown in pages 47-54 in multi-way trees lecture

90, 22, 27, 24, 28, 20, 51, 63, 8, 80, 15, 71, 35, 55

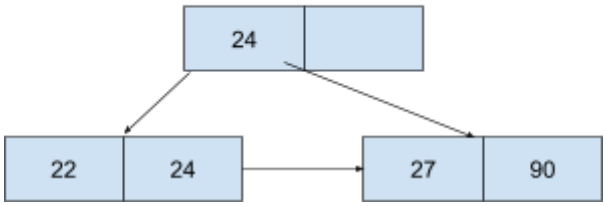
Inserting 90

Inserting 22

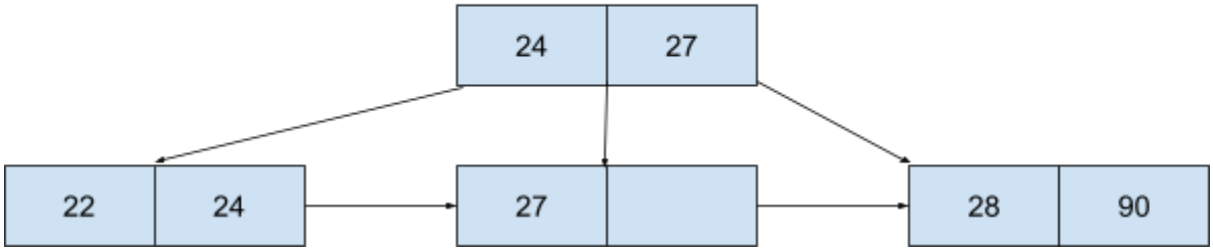
Inserting 27



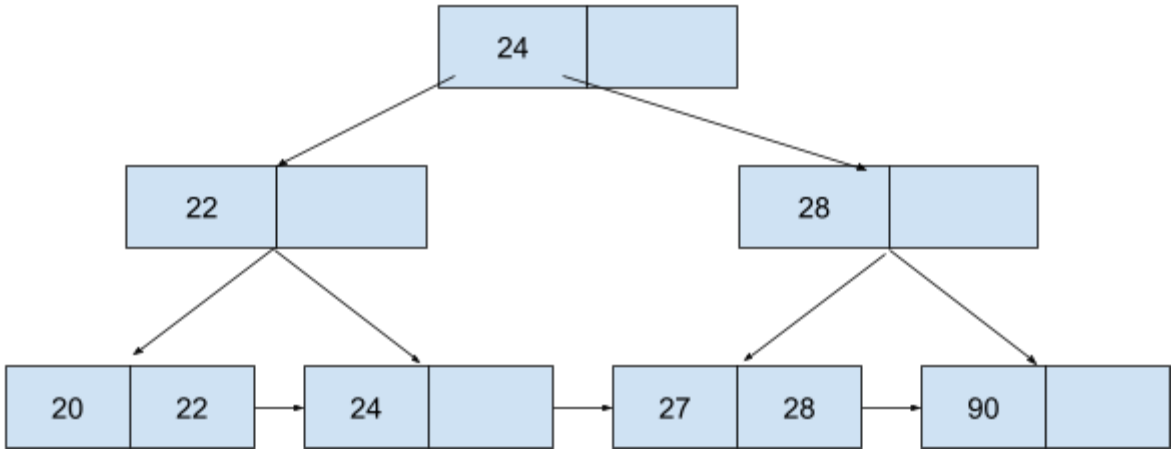
Inserting 24



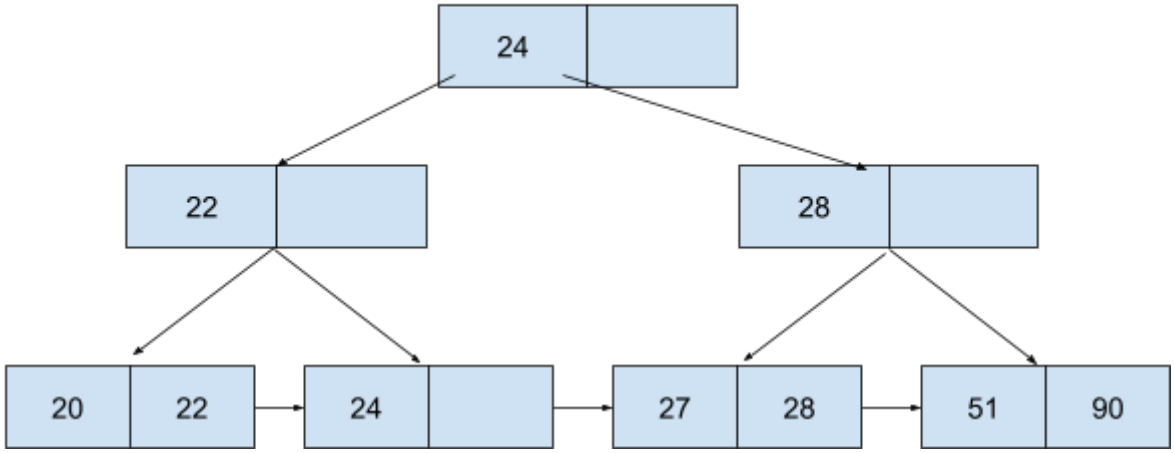
Inserting 28



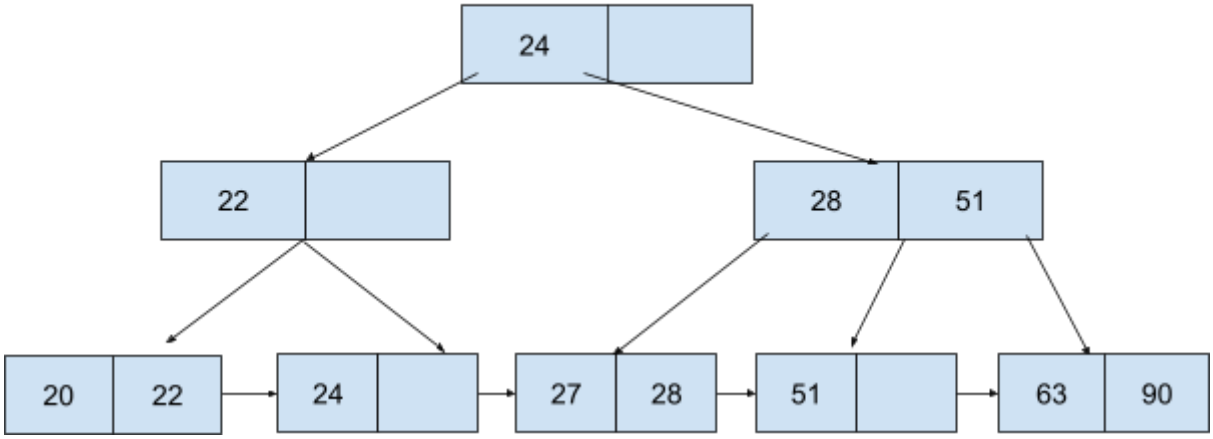
Inserting 20



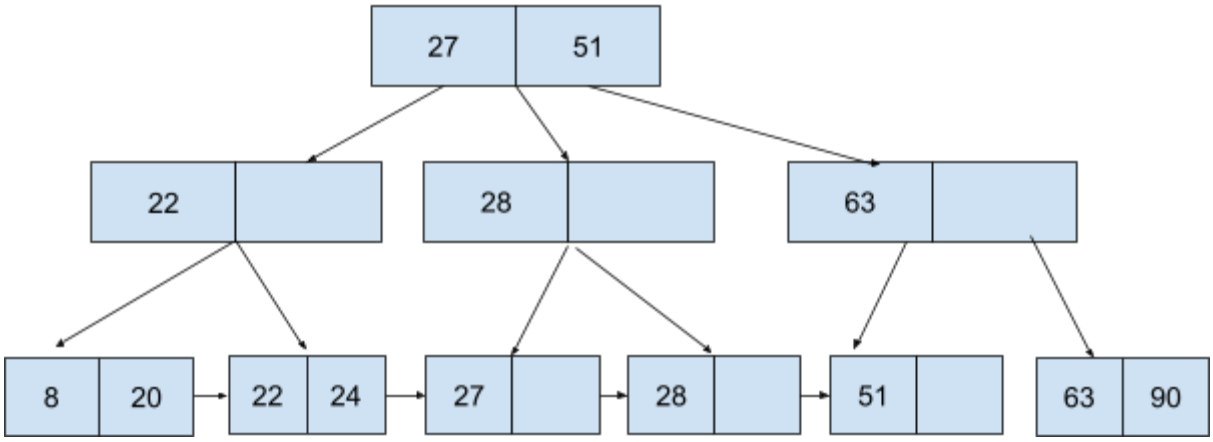
Inserting 51



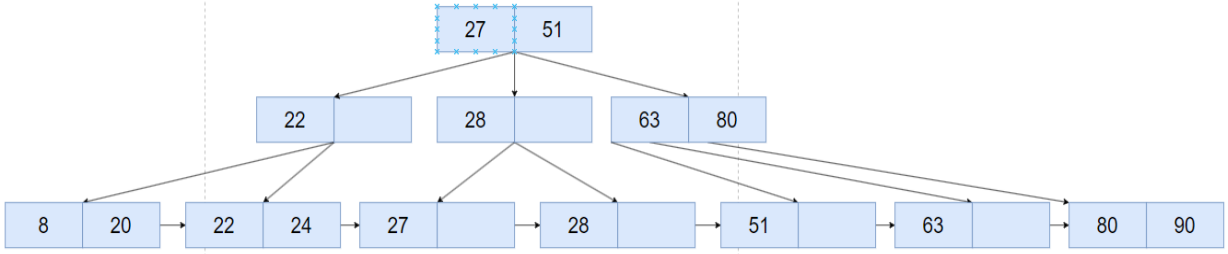
Inserting 63



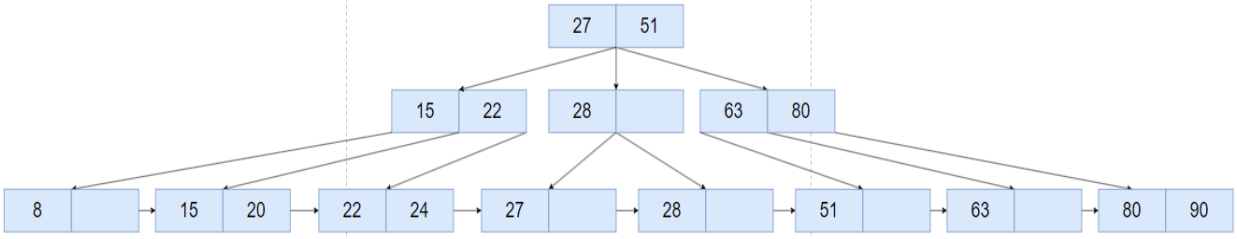
Inserting 8



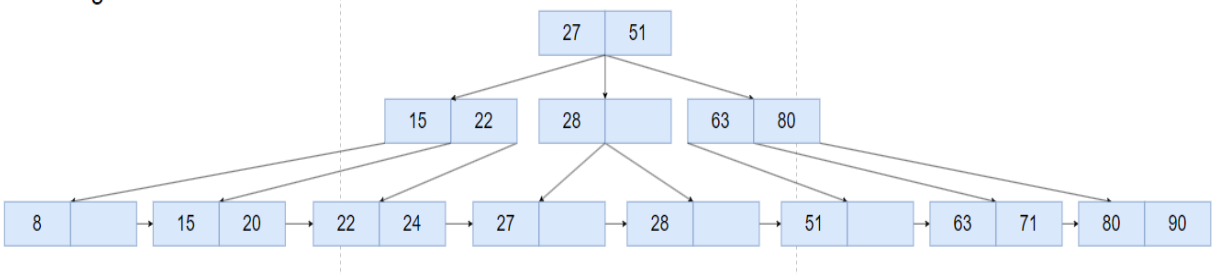
Inserting 80



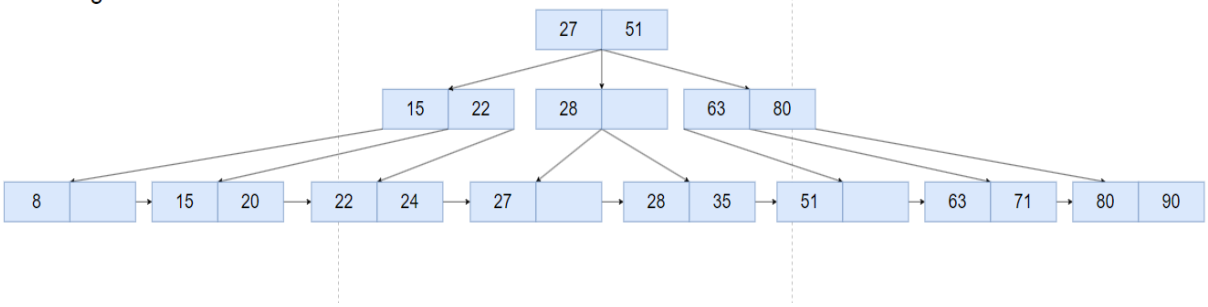
Inserting 15



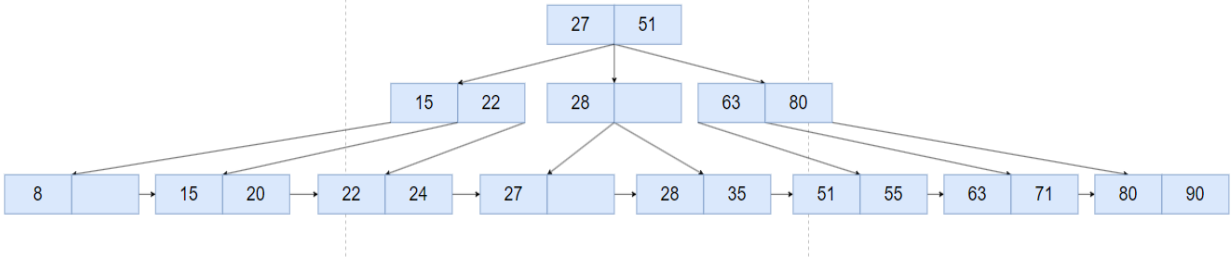
Inserting 71



Inserting 35



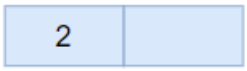
Inserting 55



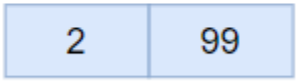
Question 4:
Insert the following into B- tree of order 3. Show your work step by step with proper illustration of pointers as shown in pages 47-54 in multi-way trees lecture

2, 99, 9, 71, 16, 11, 15, 13, 91, 92, 94

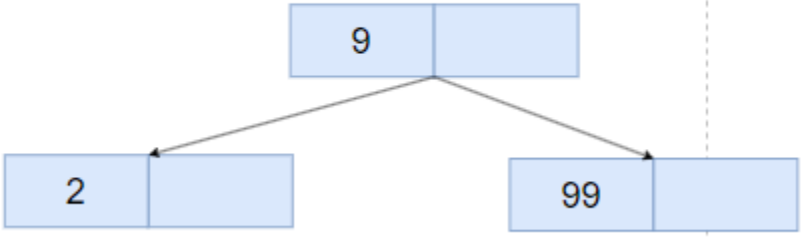
Inserting 2



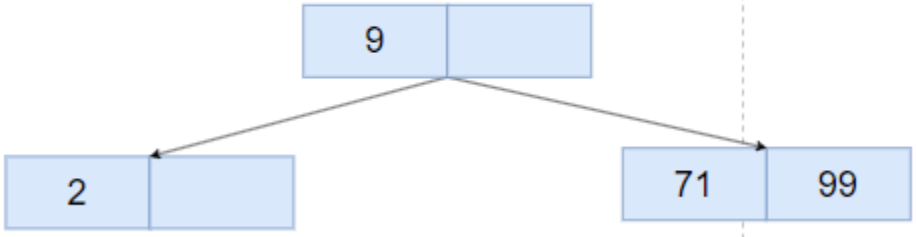
Inserting 99



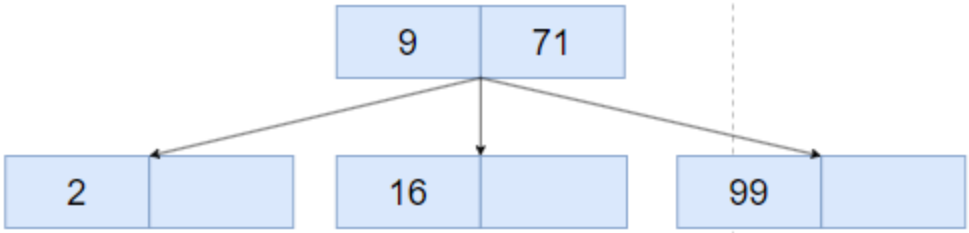
Inserting 9



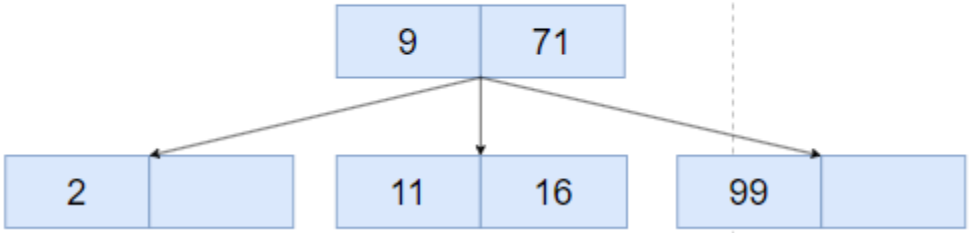
Inserting 71



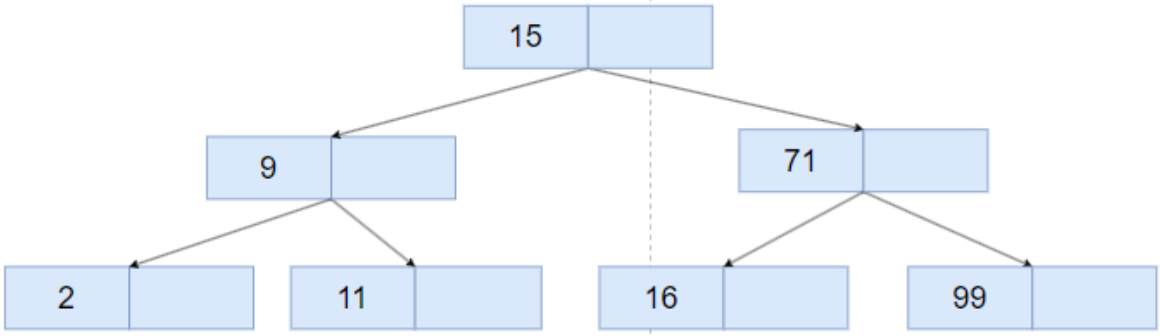
Inserting 16



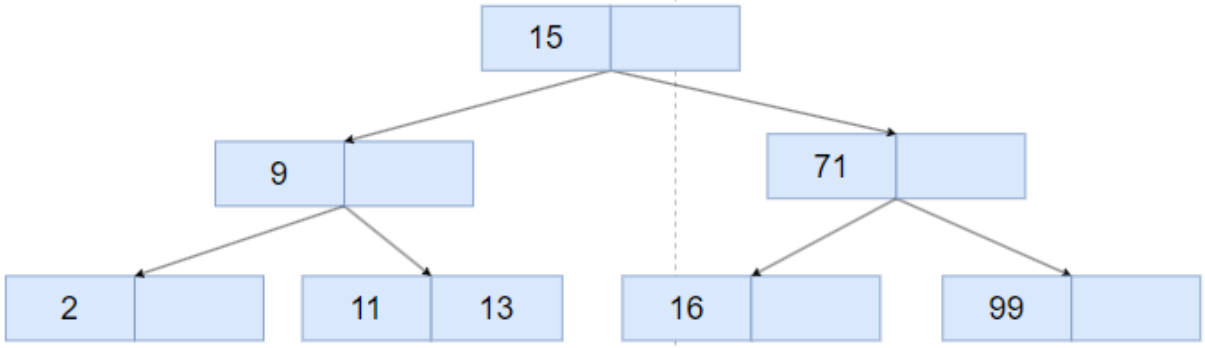
Inserting 11



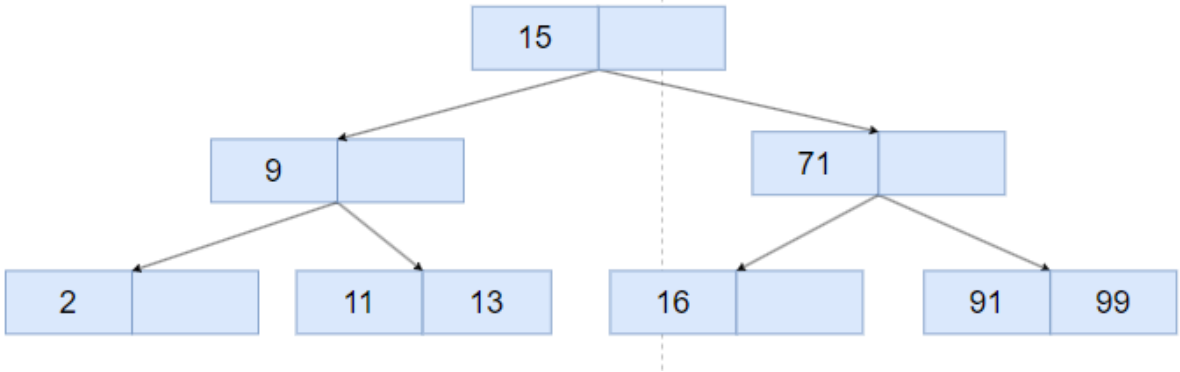
Inserting 15



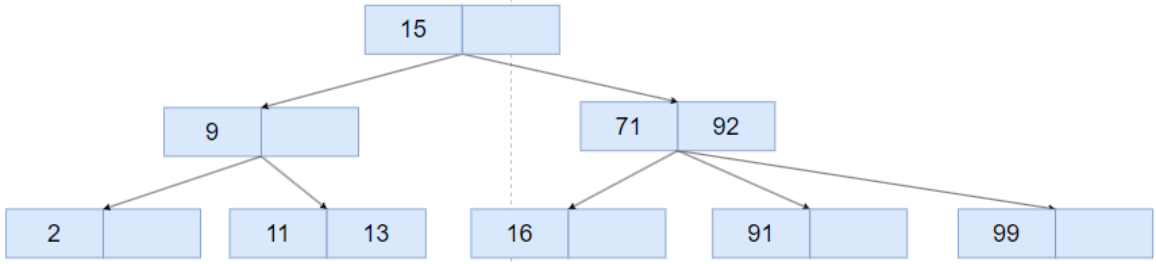
Inserting 13

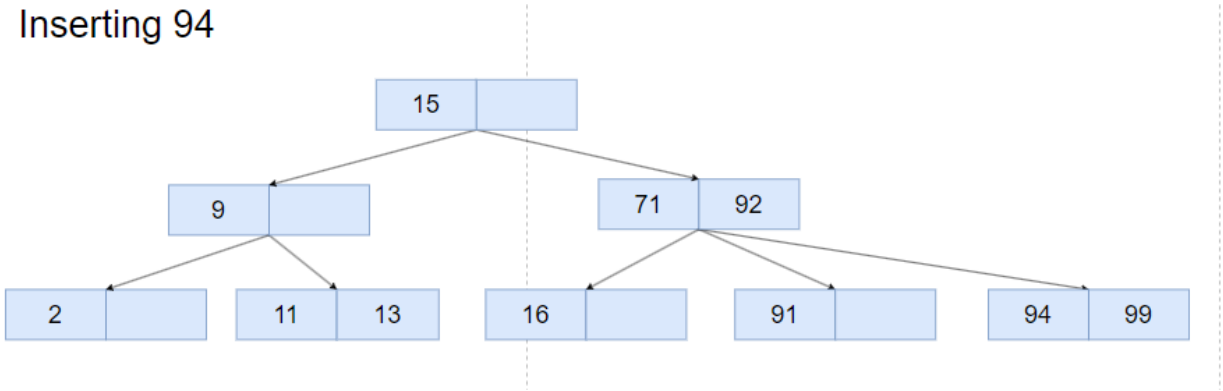


Inserting 91



Inserting 92





Question 5:

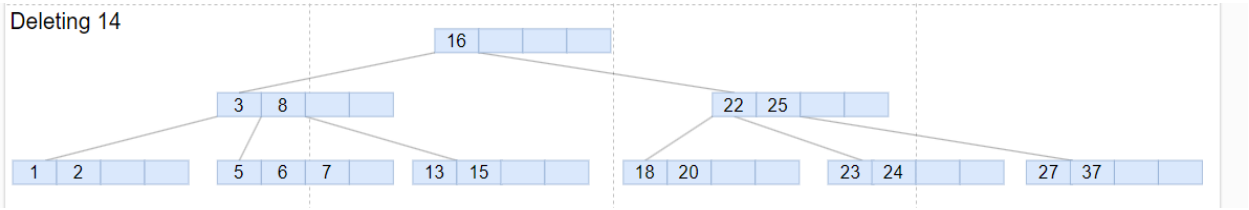
Consider the following B-tree.

a) Redraw the tree after deleting 14.

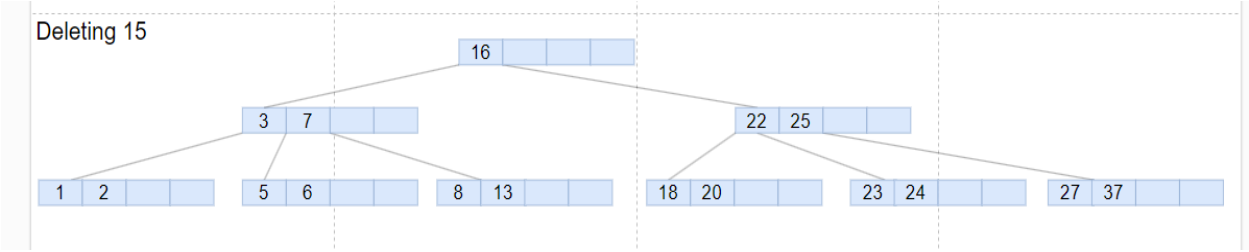
b) Again, redraw the tree after deleting 15.

c) Again, redraw the tree after deleting 25.

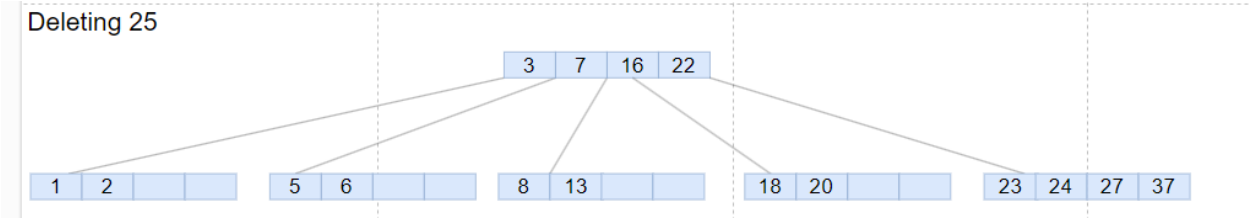
a)



b)



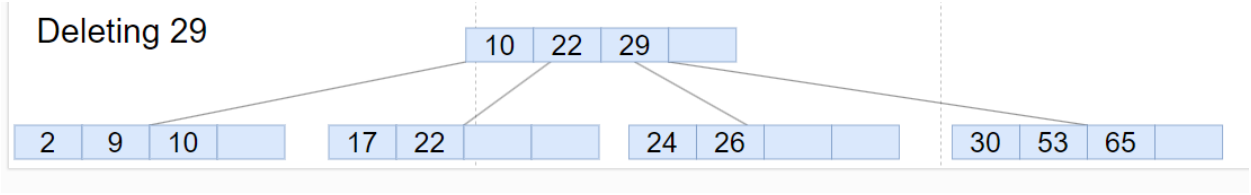
c)



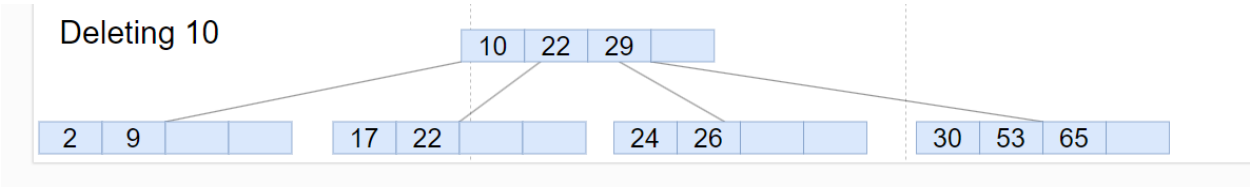
Consider the following B+ tree:

a) Delete 29 and redraw the tree after that
b) Next delete 10 and redraw the tree after that
c) Next delete 26 and redraw the tree after that
d) Next delete 24 and redraw the tree after that
e) Next delete 9 and redraw the tree after that

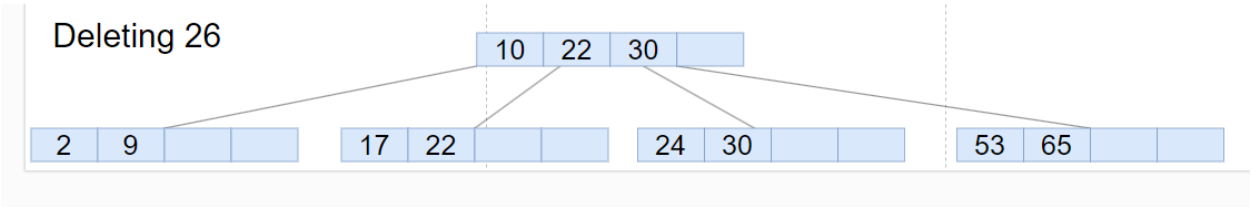
a)



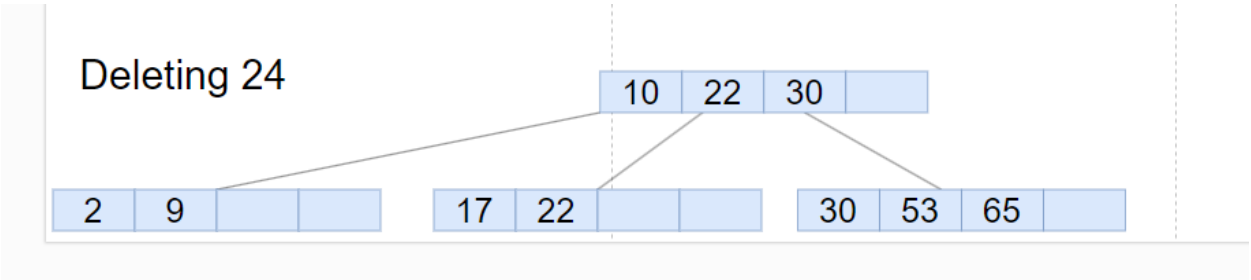
b)



c)



d)



e)