

# CS 443 – Assignment 9

## Question 1:

Insert the following into B<sup>+</sup> tree of order 3. Show your work step by step with proper illustration of pointers as shown in the lecture notes

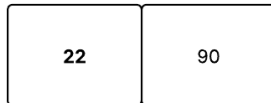
90, 22, 27, 24, 28, 20, 51, 63, 8, 80, 15, 71, 35, 55

Pictures also included in the folder for better view quality

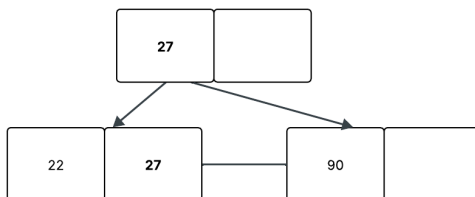
Insert 90:



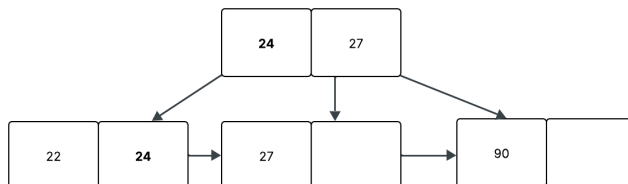
Insert 22:



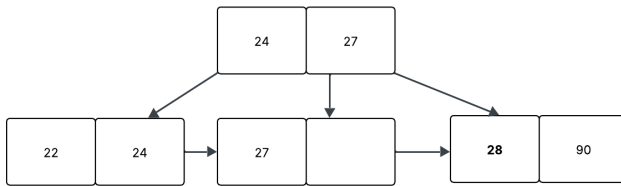
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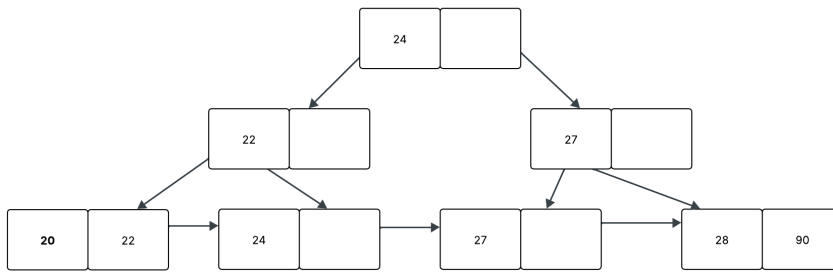
Insert 24:



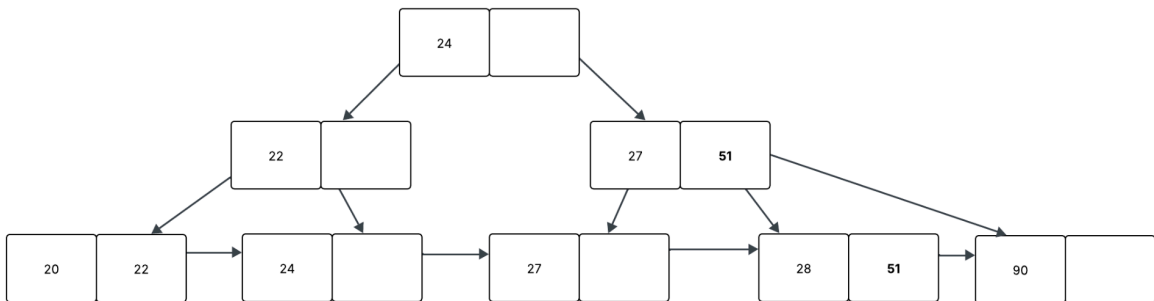
Insert 28:



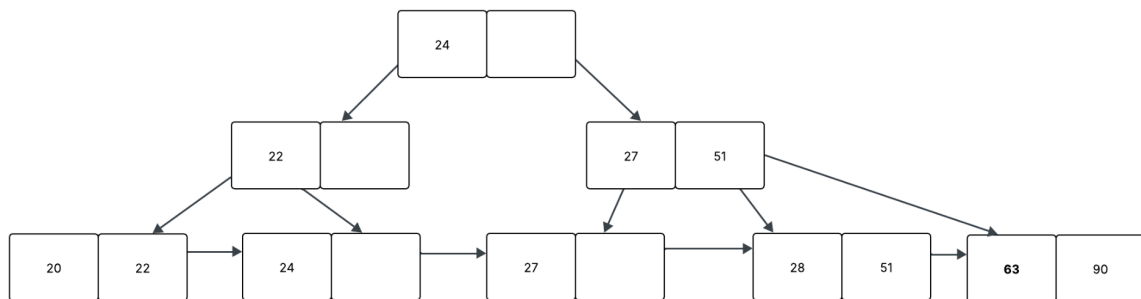
Insert 20:



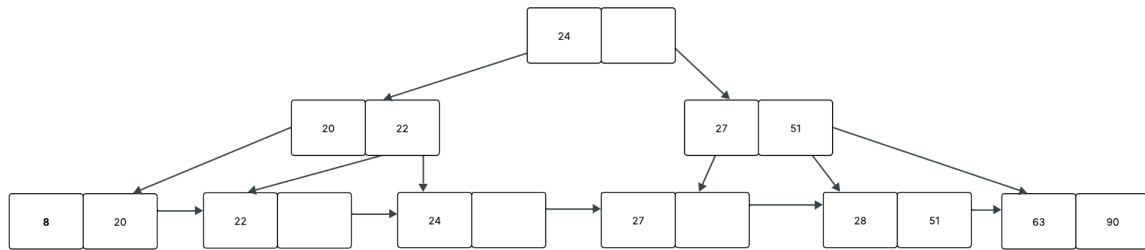
Insert 51:



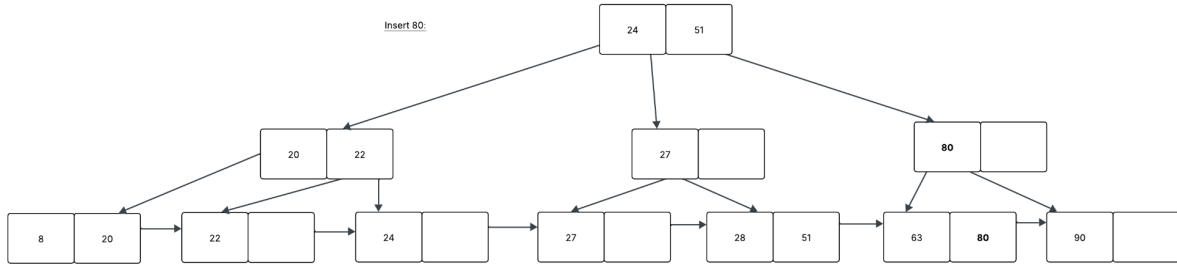
Insert 63:



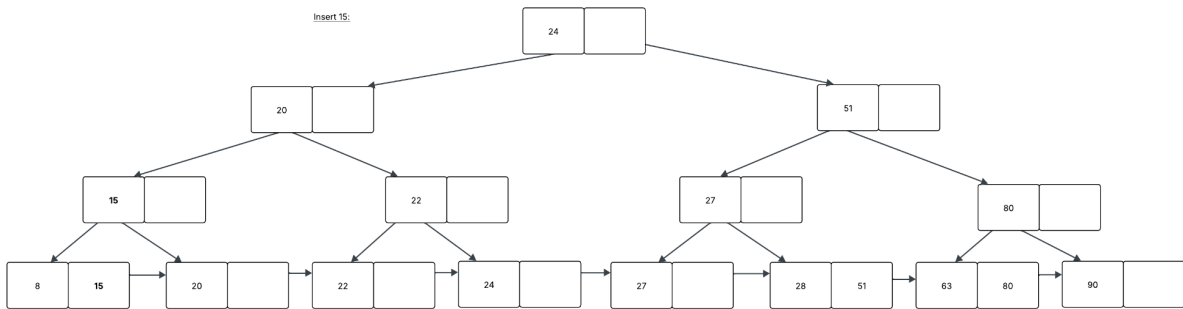
Insert 8:



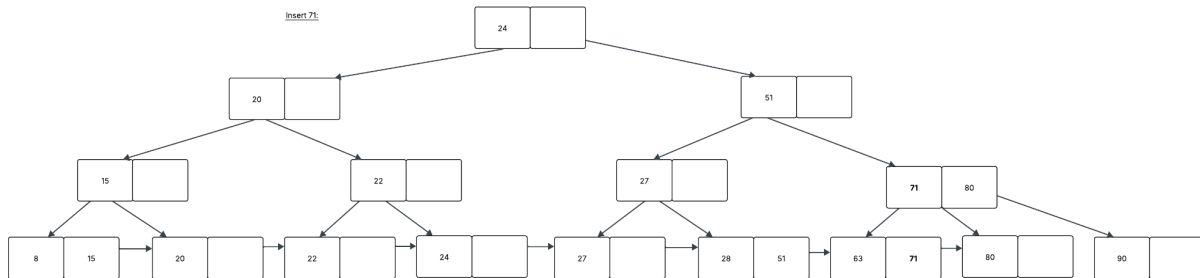
Insert 80:



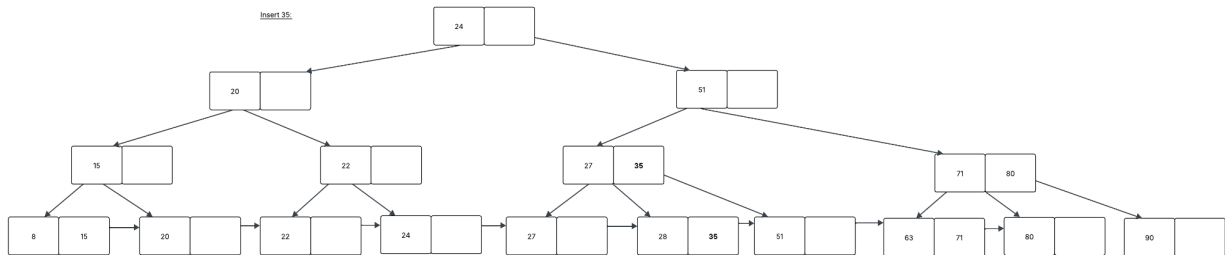
Insert 15:

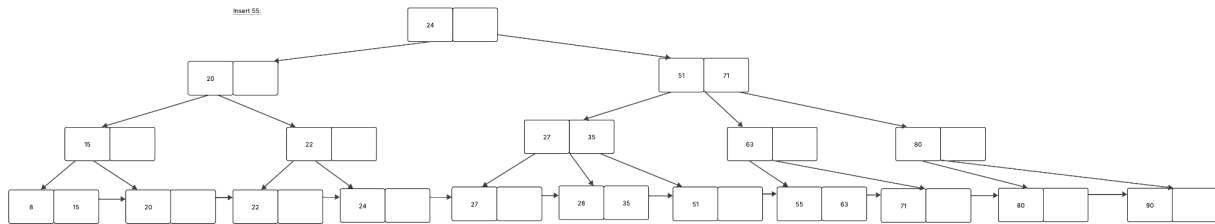


Insert 71:



Insert 35:





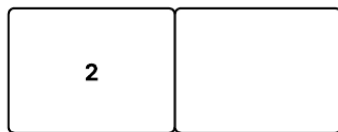
## Question 2:

Insert the following into B\_tree of order 3. Show your work step by step with proper illustration of pointers as shown in the lecture notes

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

**Pictures also included in the folder for better view quality**

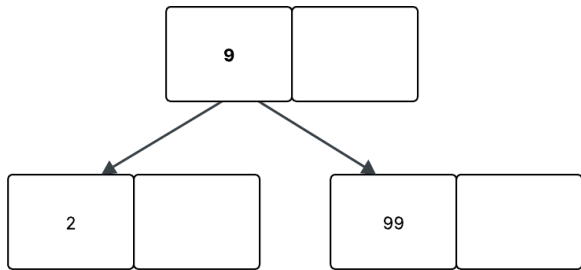
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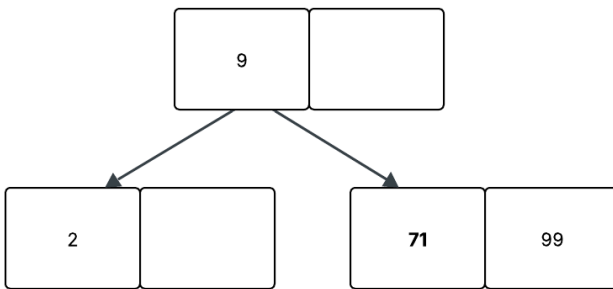
Insert 99:



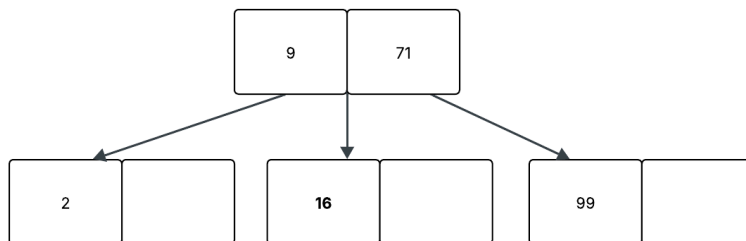
Insert 9:



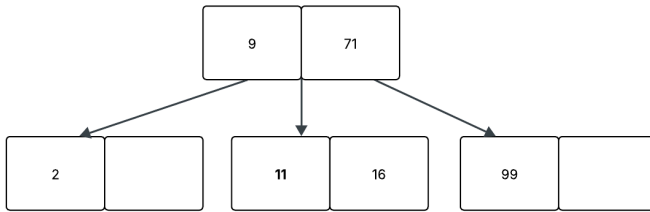
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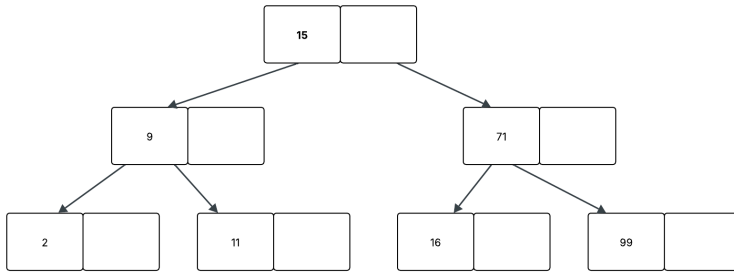
Insert 16:



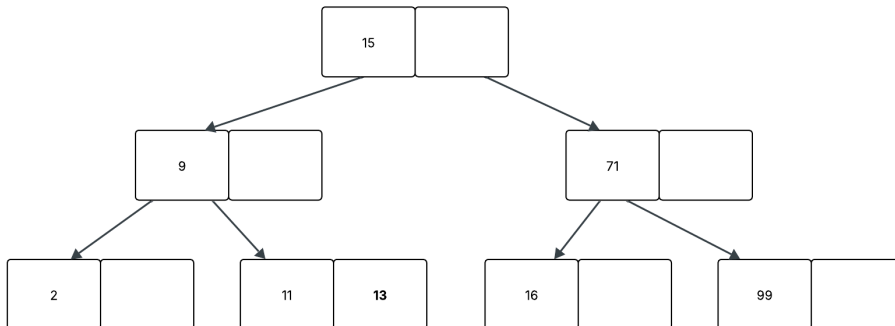
Insert 11:



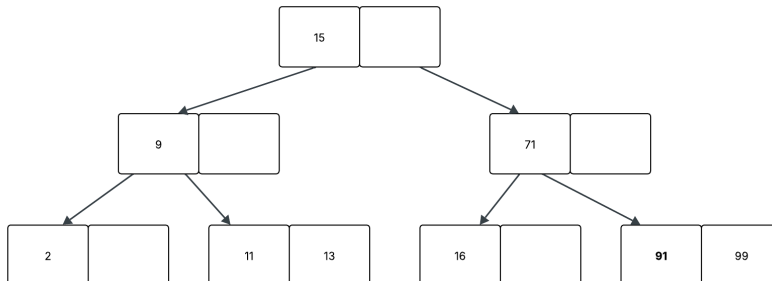
Insert 15:

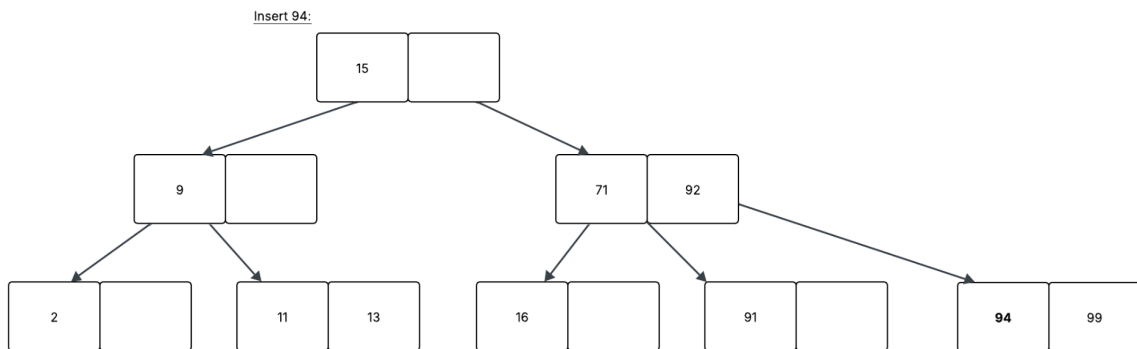
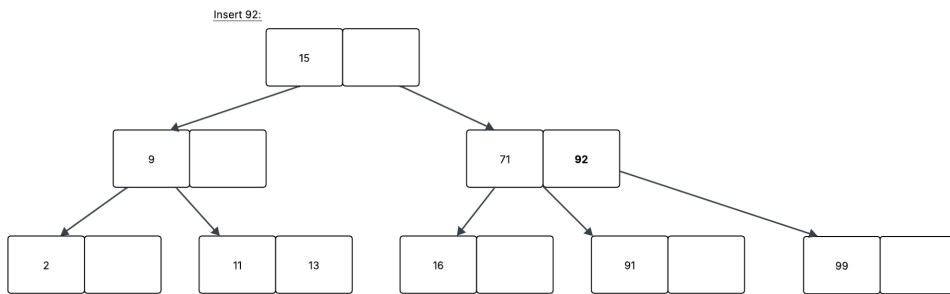


Insert 13:



Insert 91:

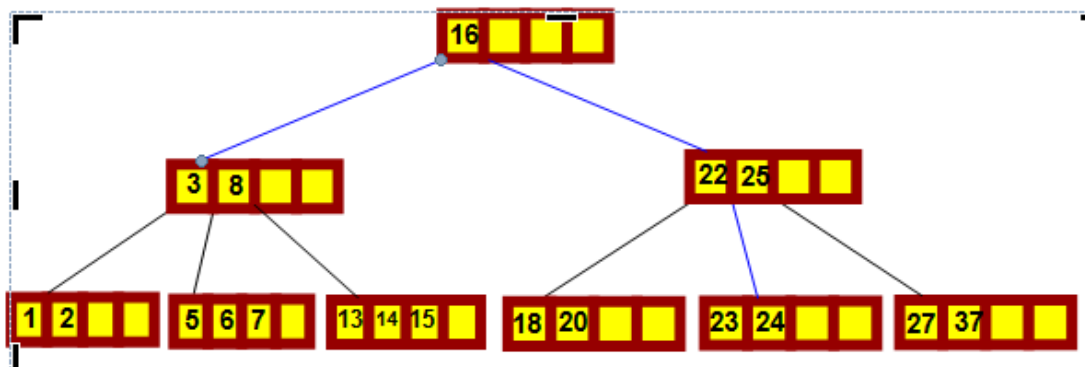




### Question 3:

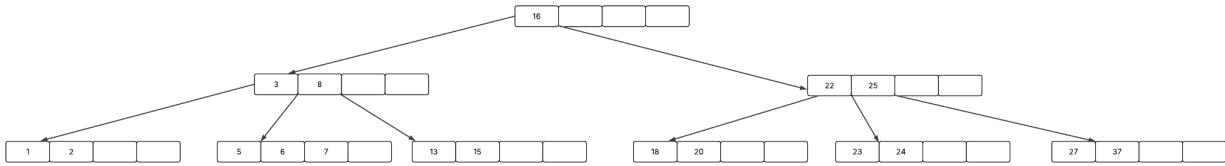
Consider the following B-tree.

- Redraw the tree after deleting 14. Lets call the modified tree-tree-1.
- Again, redraw the tree-1 after deleting 15. Lets call that tree-2.
- Again, redraw the tree-2 after deleting 25 and call it tree-3.

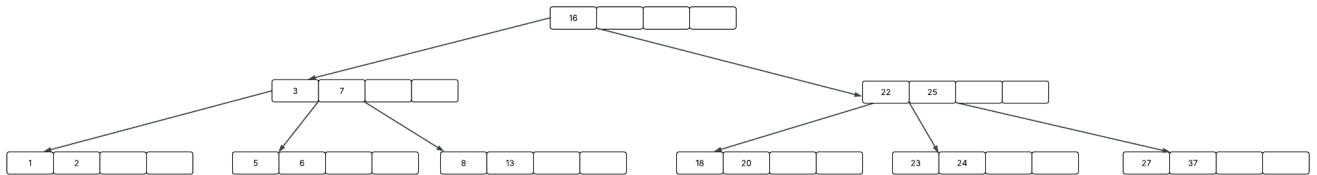


Pictures also included in the folder for better view quality

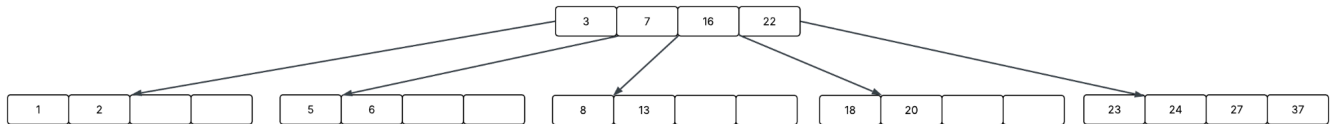
a)



b)

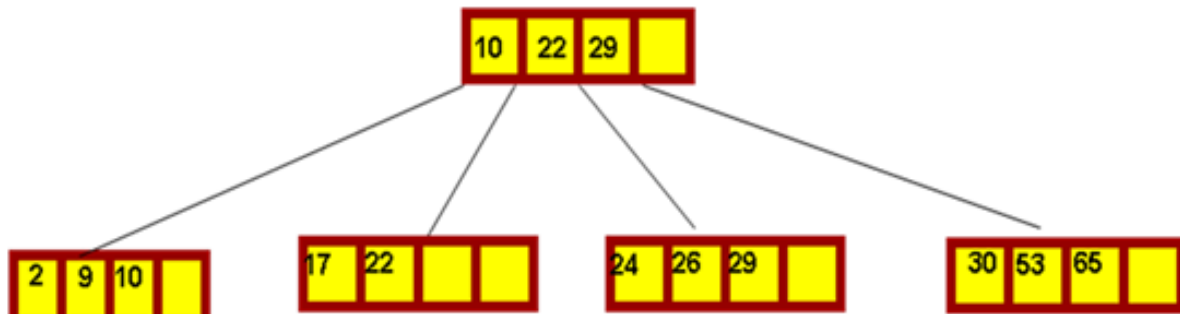


c)



#### Question 4:

Consider the following B+ tree:

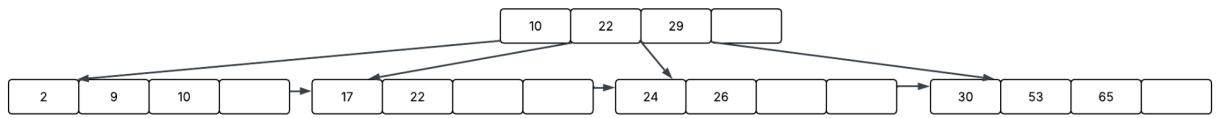


- Delete 29 and redraw the tree after that – call it tree-1.
- Next, delete 10 from tree-1 and redraw the tree after that. Call it tree-2
- Next, delete 26 from tree-2 and redraw the tree after that. Call it tree-3
- Next, delete 24 from tree-3 and redraw the tree after that. Call it tree-4
- Next delete 9 from tree-4 and redraw the tree after that. Call it tree-5

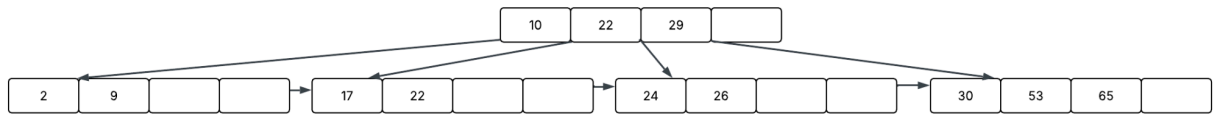
**Pictures also included in the folder for better view quality**



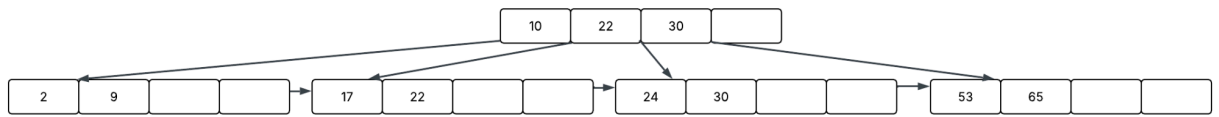
a)



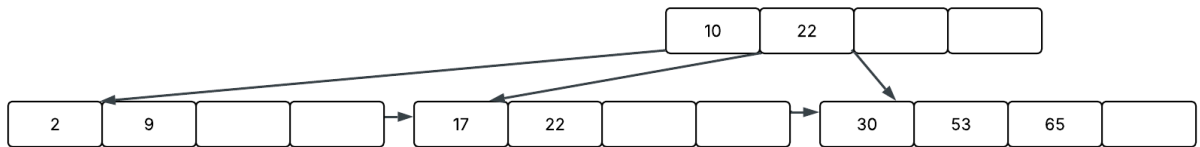
b)



c)



d)



e)

