CS & IT ENGINEERING

Data Structure & Programming

Tree

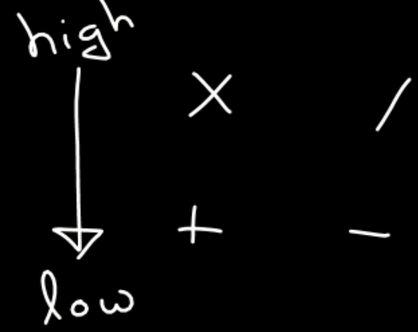
Lec- 09

By- Pankaj Sharma Sir

Tree 09

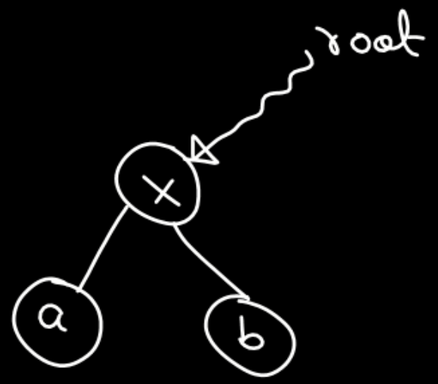
Expression tree

Infix : a x b + c/d - e



- operands : leaf
- operators : Internal nodes

a x b



Expression tree

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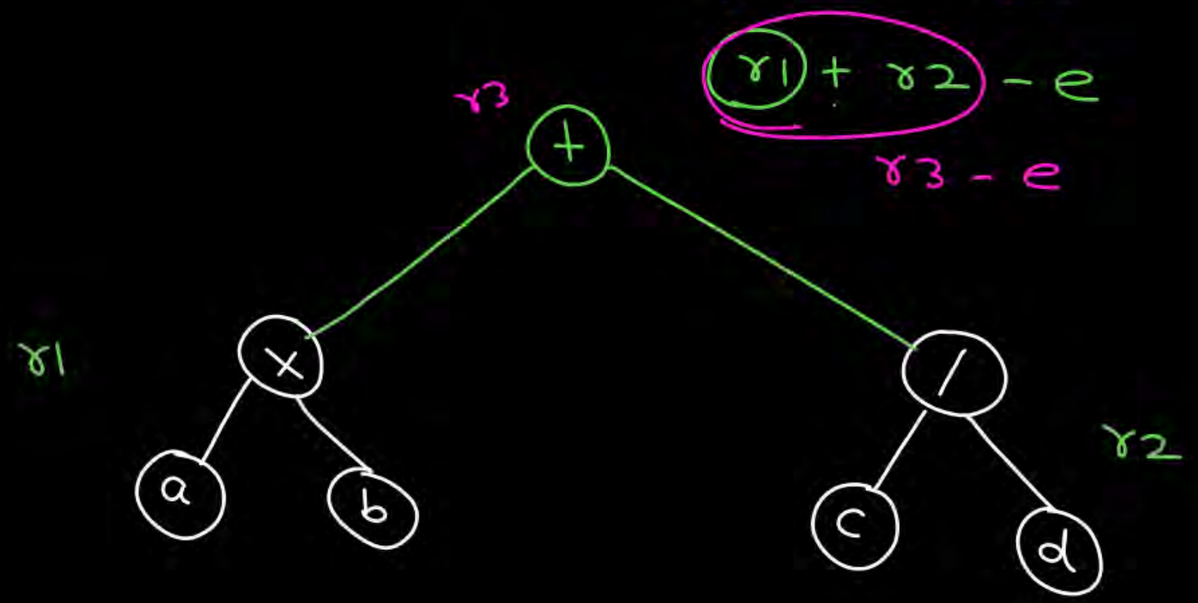


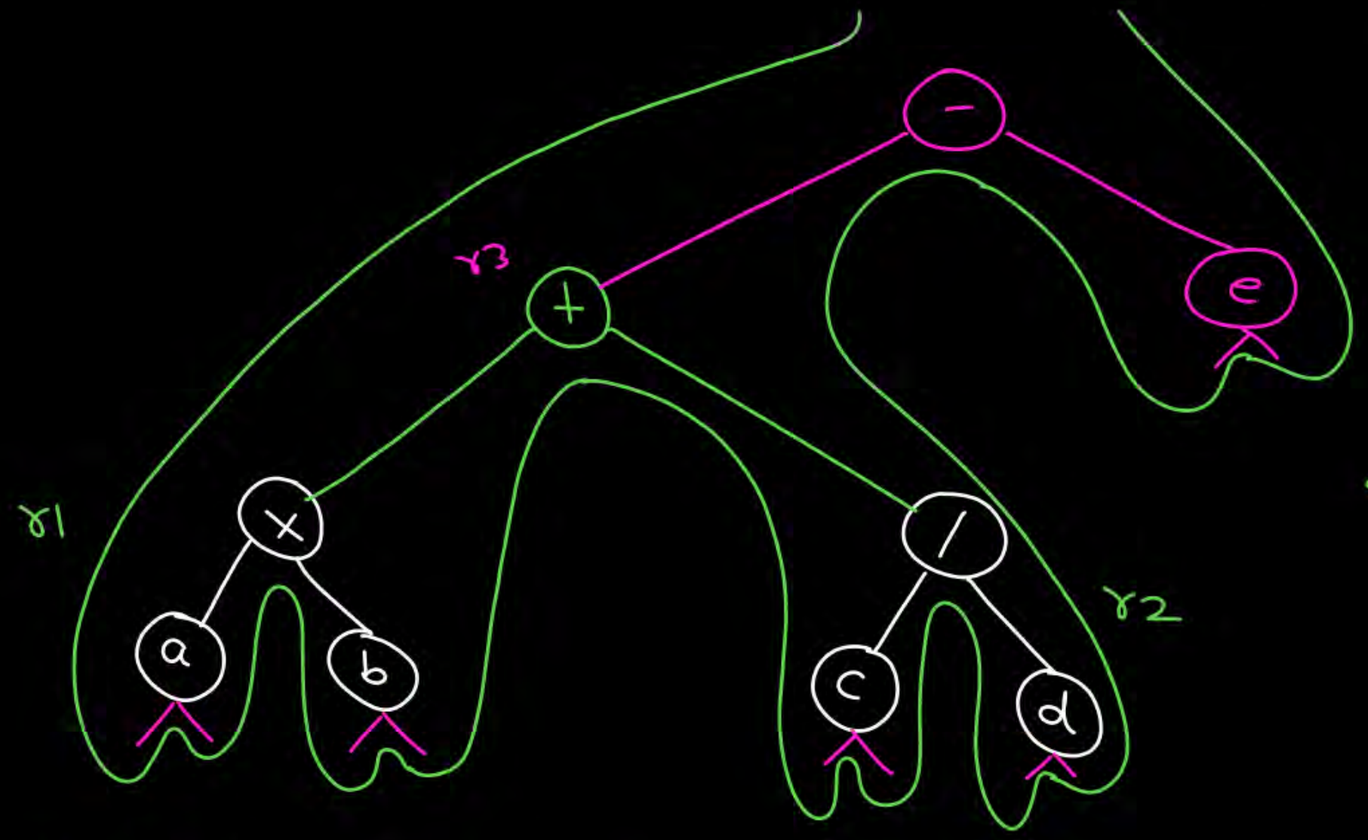
Expression tree

Infix : a x b + c/d - e

r1 r2

r1 + r2 - e

r3 - e



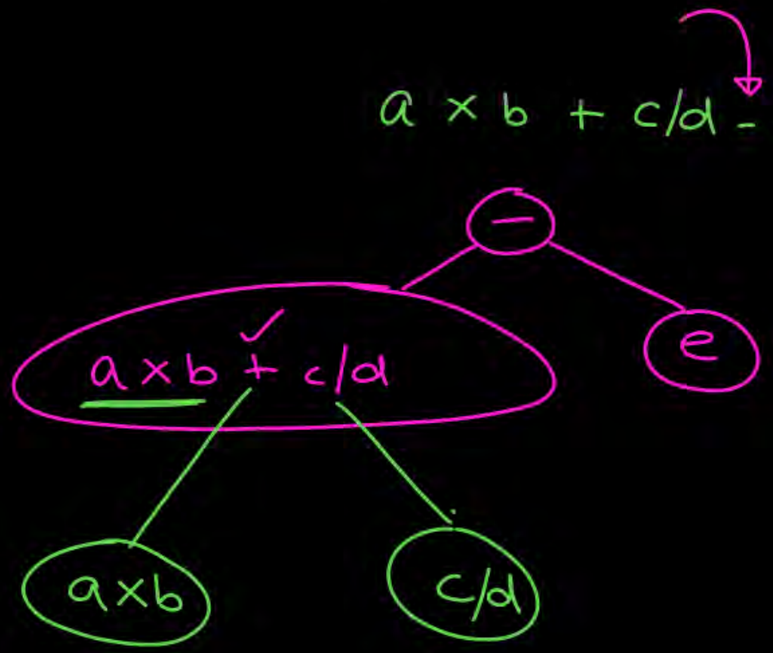
Root ⇒ least priority

last

Inorder : a x b + c/d - e

Expression tree

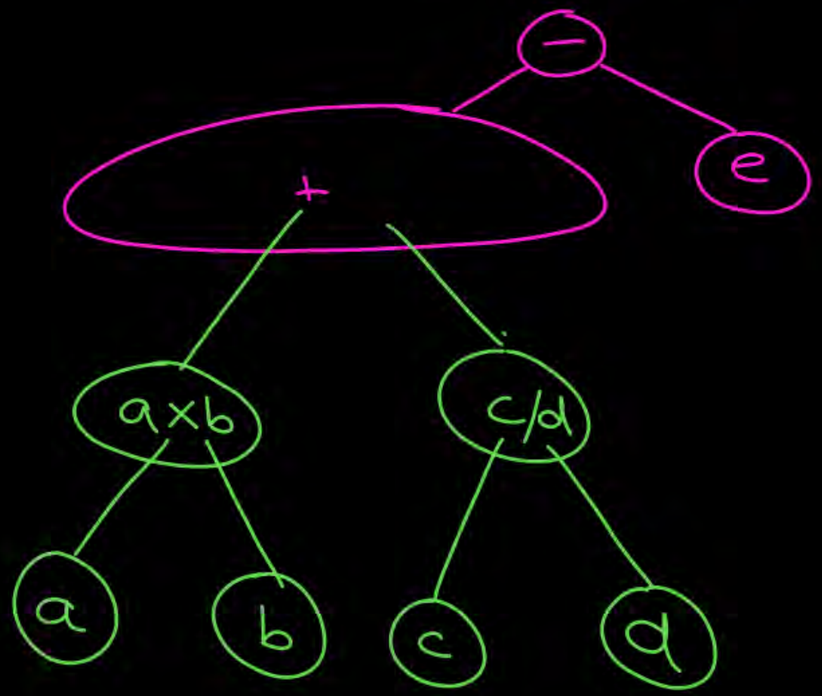
Infix : a x b + c/d - e



Expression tree

Infix : a x b + c/d - e

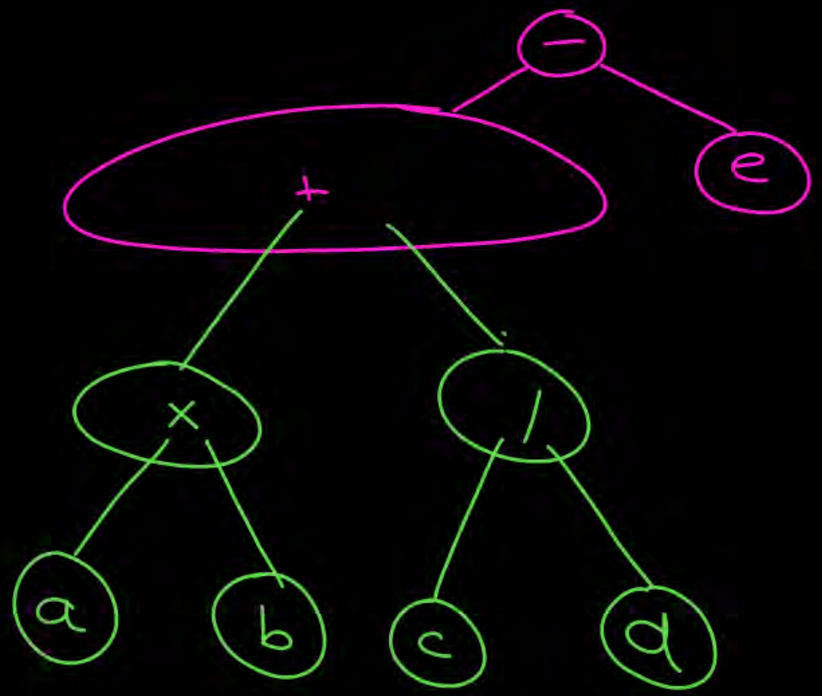
a x b + c/d - e



Expression tree

Infix : a x b + c/d - e

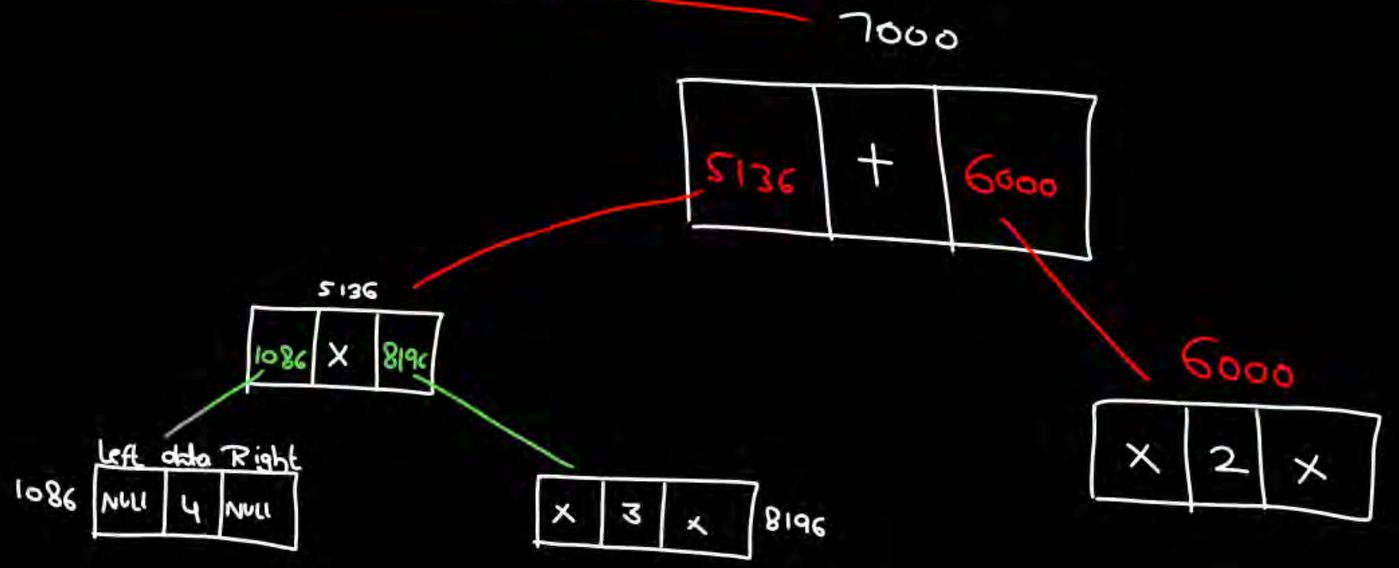
a x b + c/d - e



Postfix to Expression tree

Infix : 4 x 3 + 2

Postfix : 4 3 x 2 + End

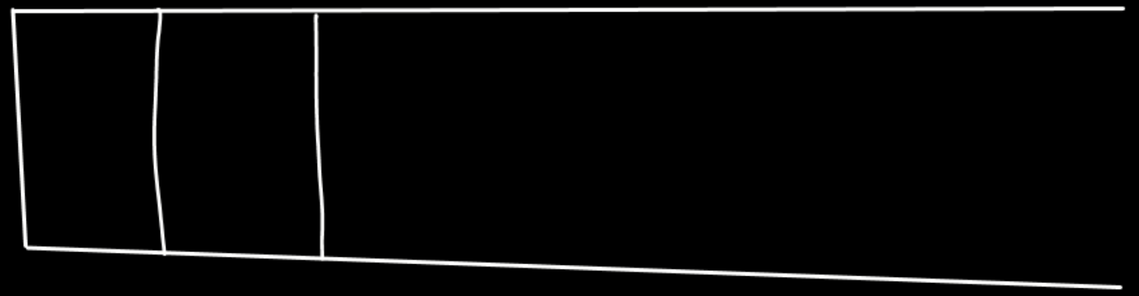


Prefix to Exp. tree

Infix : 2+3x4

Prefix : +2x34

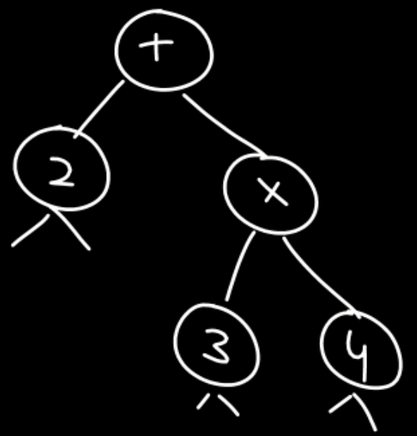
Reverse : 43x2+ End



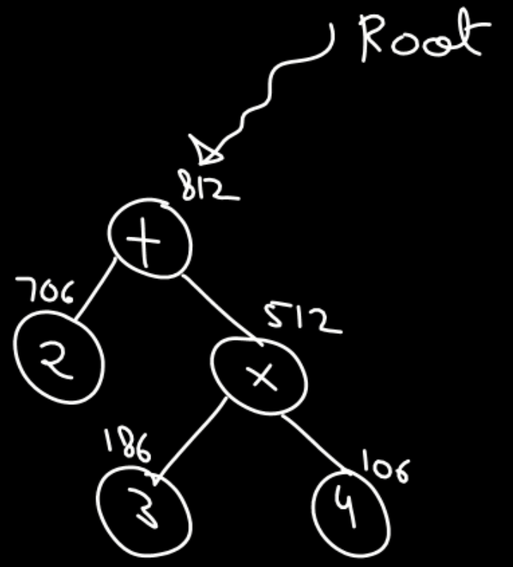
Inorder : Infix

Preorder : Prefix

Postorder : Postfix



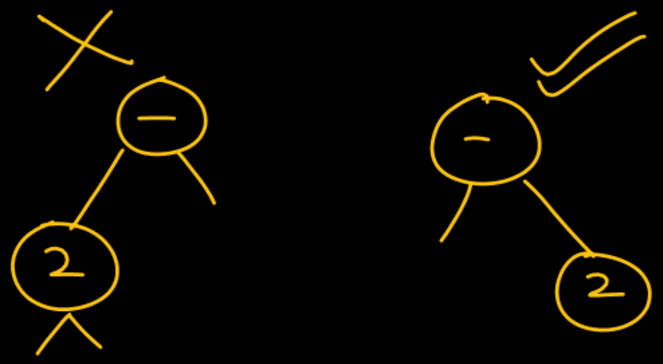
2+3x4



Exp: Unary operator

Unary operator > binary op.

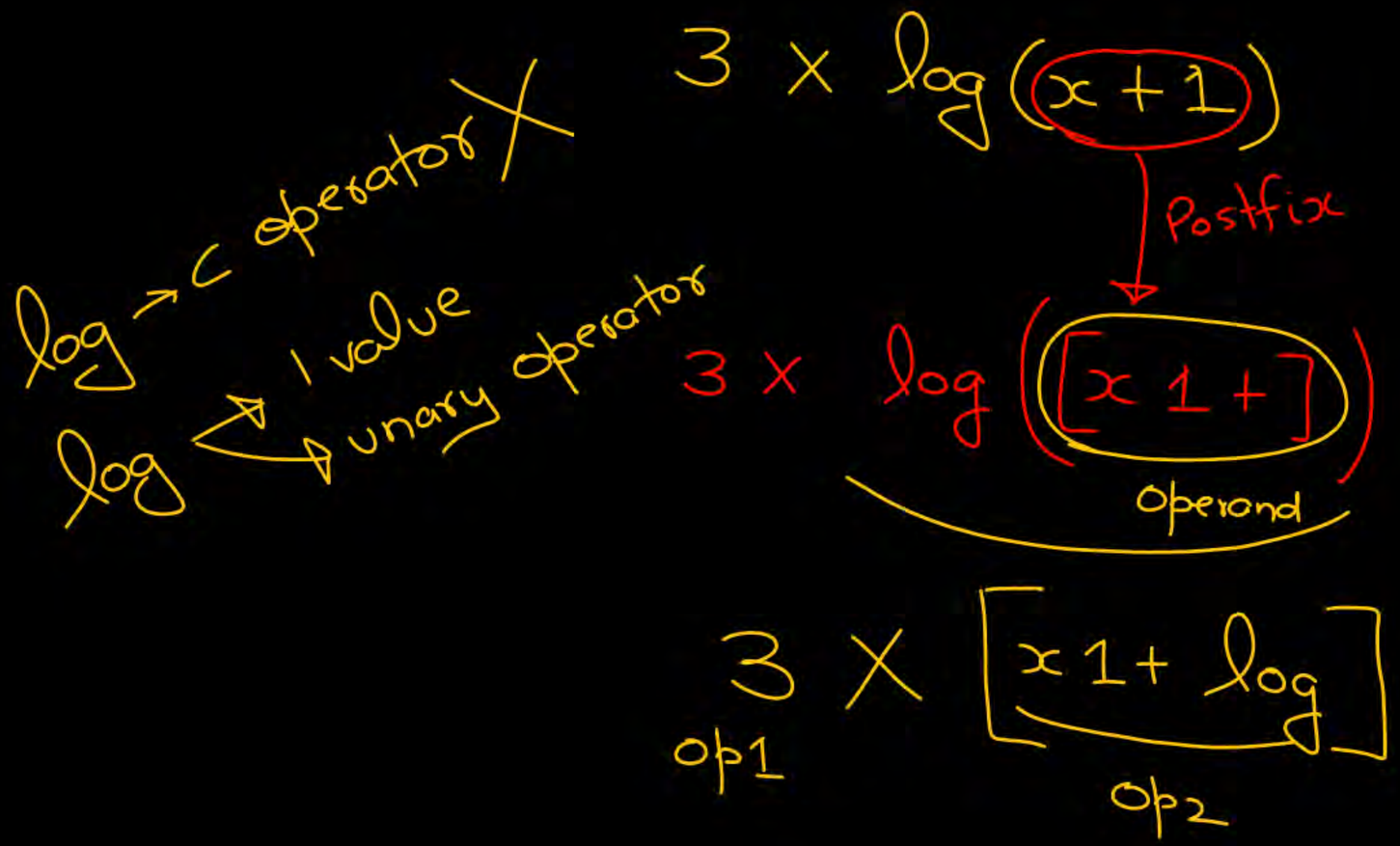
-2



$3 \times \log(x+1)$

Inorder : 2-

-2


log → c operator X
log → value
log → unary operator
3 x log (x + 1)
Postfix
3 x log [x 1 +]
Operand
3 X [x 1+ log]
op1
op2
3 x 1 + log X

1. Which one of the following seq. when stored in an array at loc. A[1] to A[10] result a max-heap.

Gate - 2023

A) 23, 14, 19, 1, 10, 13, 16, 12, 7, 5

B) 23, 17, 14, 7, 13, 10, 1, 5, 6, 12

C) 23, 17, 10, 6, 13, 14, 1, 5, 9, 12

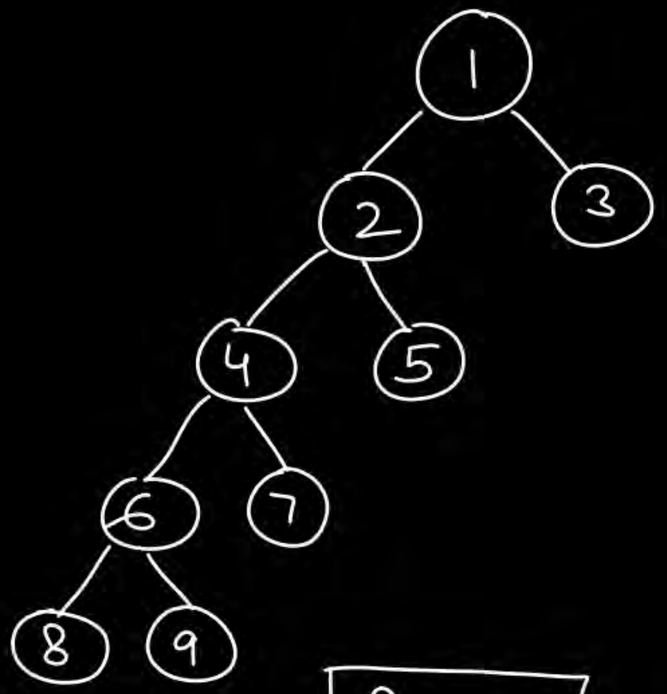
D) 23, 17, 14, 6, 13, 10, 1, 5, 7, 15

2. The postorder traversal of a binary tree is 8, 9, 6, 7, 4, 5, 2, 3, 1.

The inorder trav. of the same tree is 8, 6, 9, 4, 7, 2, 5, 1, 3

The height of above binary tree is ____

2.



$h = 4$

Post : 8, 9, 6, 7, 4, 5, 2, 3, 1

In : 8, 6, 9, 4, 7, 2, 5, 1, 3

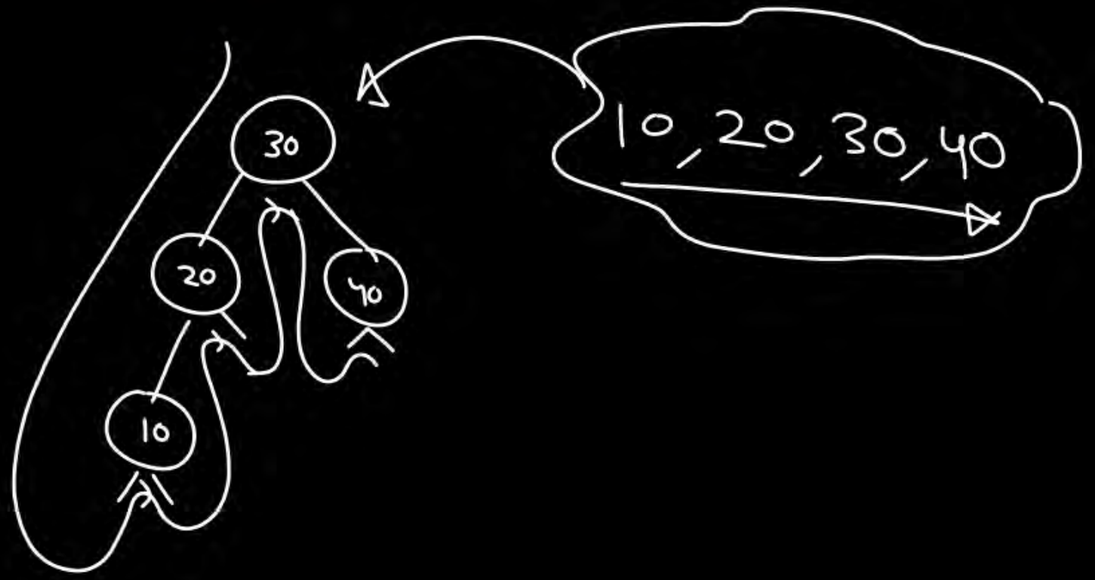
Q) We are given a set of n distinct elements and an unlabelled binary tree with n nodes. In how many ways can we populate the tree with given set so that it become a BST.

A) 0

B) 1

C) n!

D) $\frac{2nC_n}{n+1}$



Q] A BST stores values in the range 37 to 573.

Consider the following seq. of keys.

I) 81, 537, 102, 439, 285, 376, 305

II) 52, 97, 121, 195, 242, 381, 472

III) 142, 248, 520, 386, 345, 270, 307

IV 550, 149, 507, 395, 463, 402, 270

Suppose the BST has been surressfully searched for key 273.

Which all of above seq. list nodes in the order in which we could have Encountered them in search.

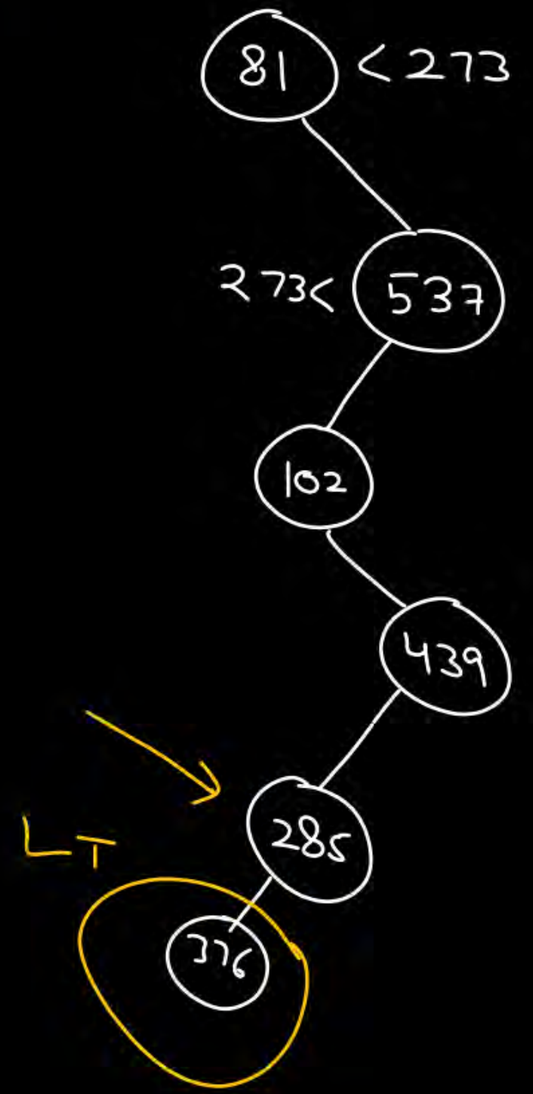
Q] A BST stores values in the range 37 to 573. Consider the following seq. of keys.

I) 81, 537, 102, 439, 285, 376, 305 ✗

II) 52, 97, 121, 195, 242, 381, 472

III) 142, 248, 520, 386, 345, 270, 307

IV 550, 149, 507, 395, 463, 402, 270



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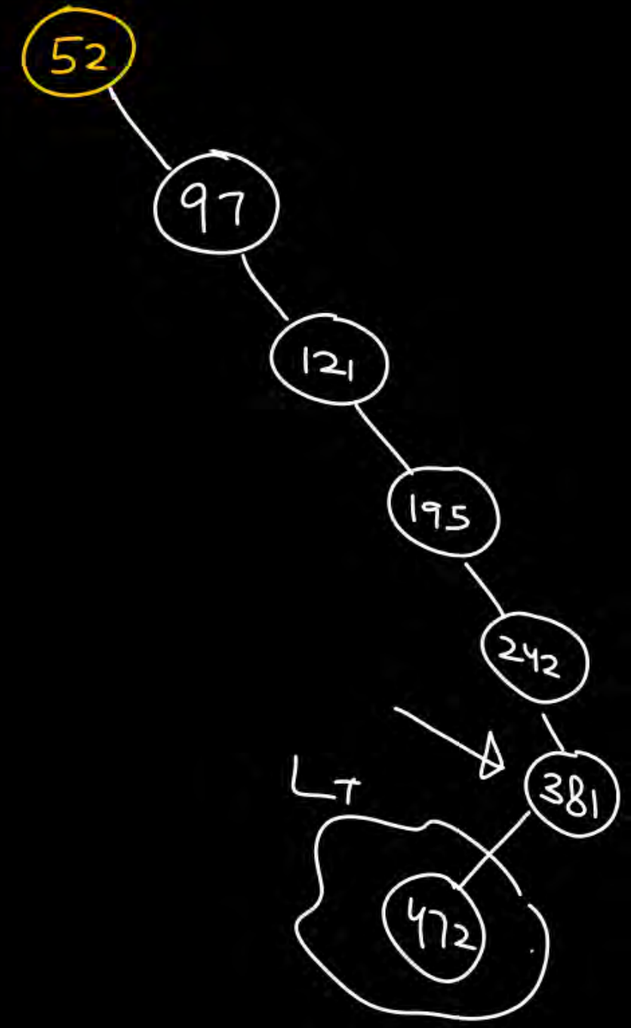

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II) 52, 97, 121, 195, 242, 381, 472 ✗

III) 142, 248, 520, 386, 345, 270, 307 ✓

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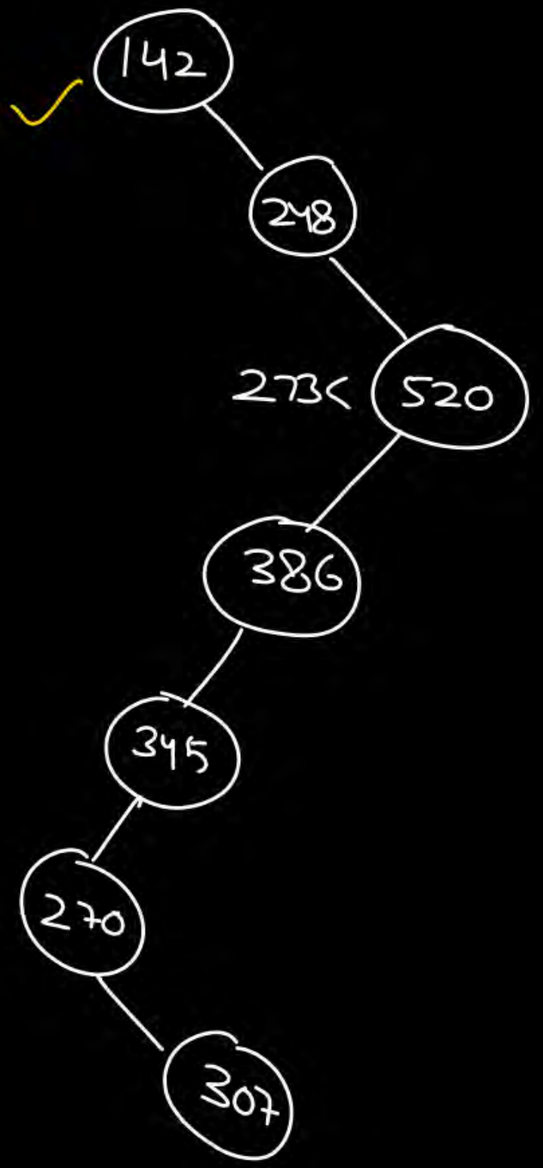

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III) 142, 248, 520, 386, 345, 270, 307 ✓

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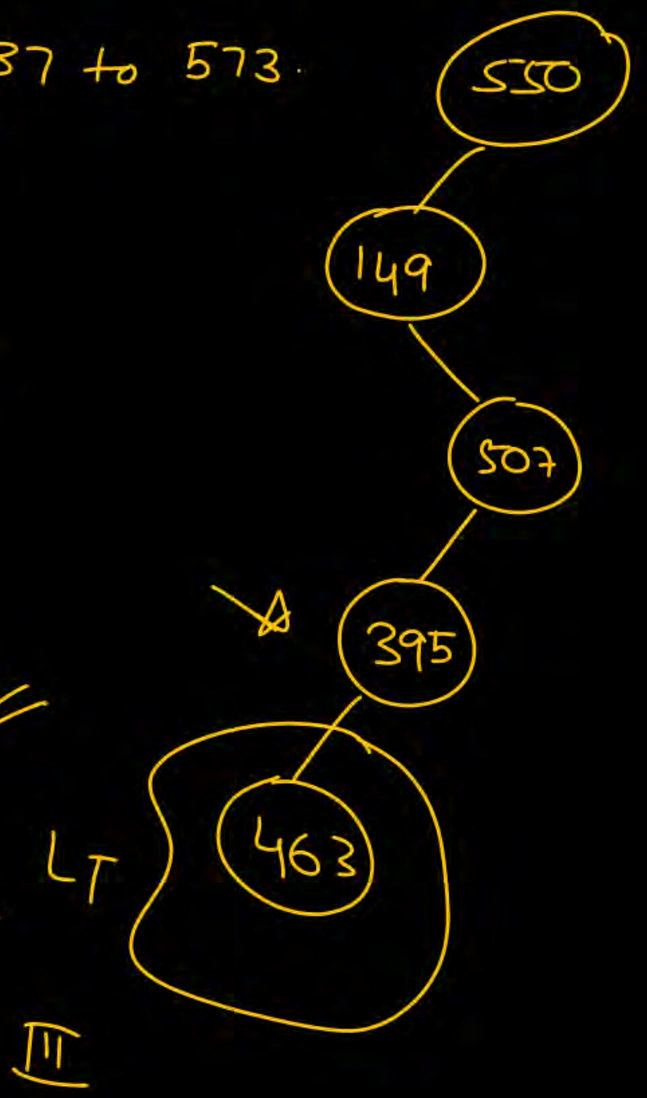
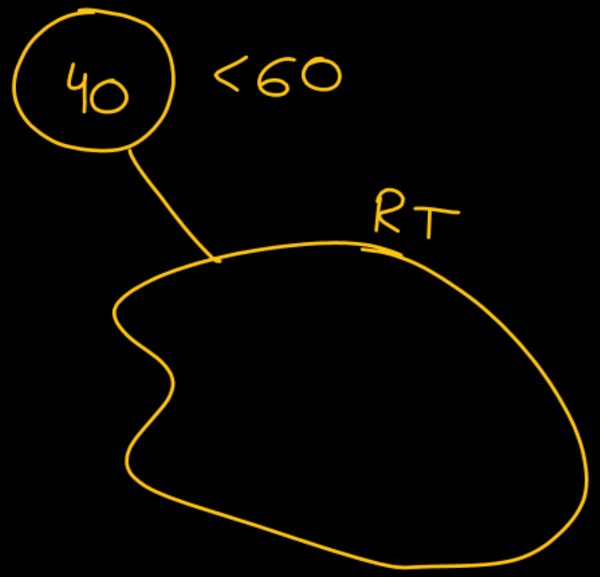
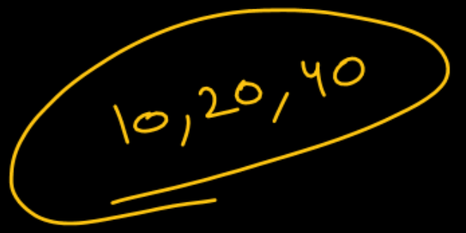


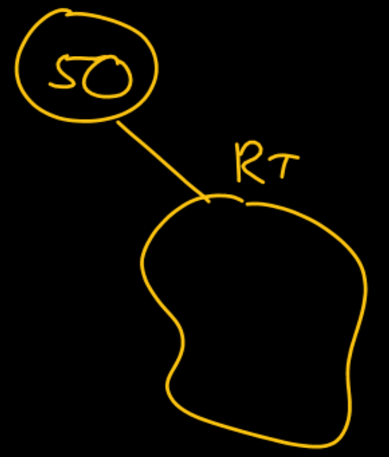
When searching for the key 60 in a BST nodes containing keys 10, 20, 40, 50, 70, 80, 90 are trav., not necessarily in this given order. How many diff. orders are possible in which these key values can occur on the search path from root to the node containing key 60?

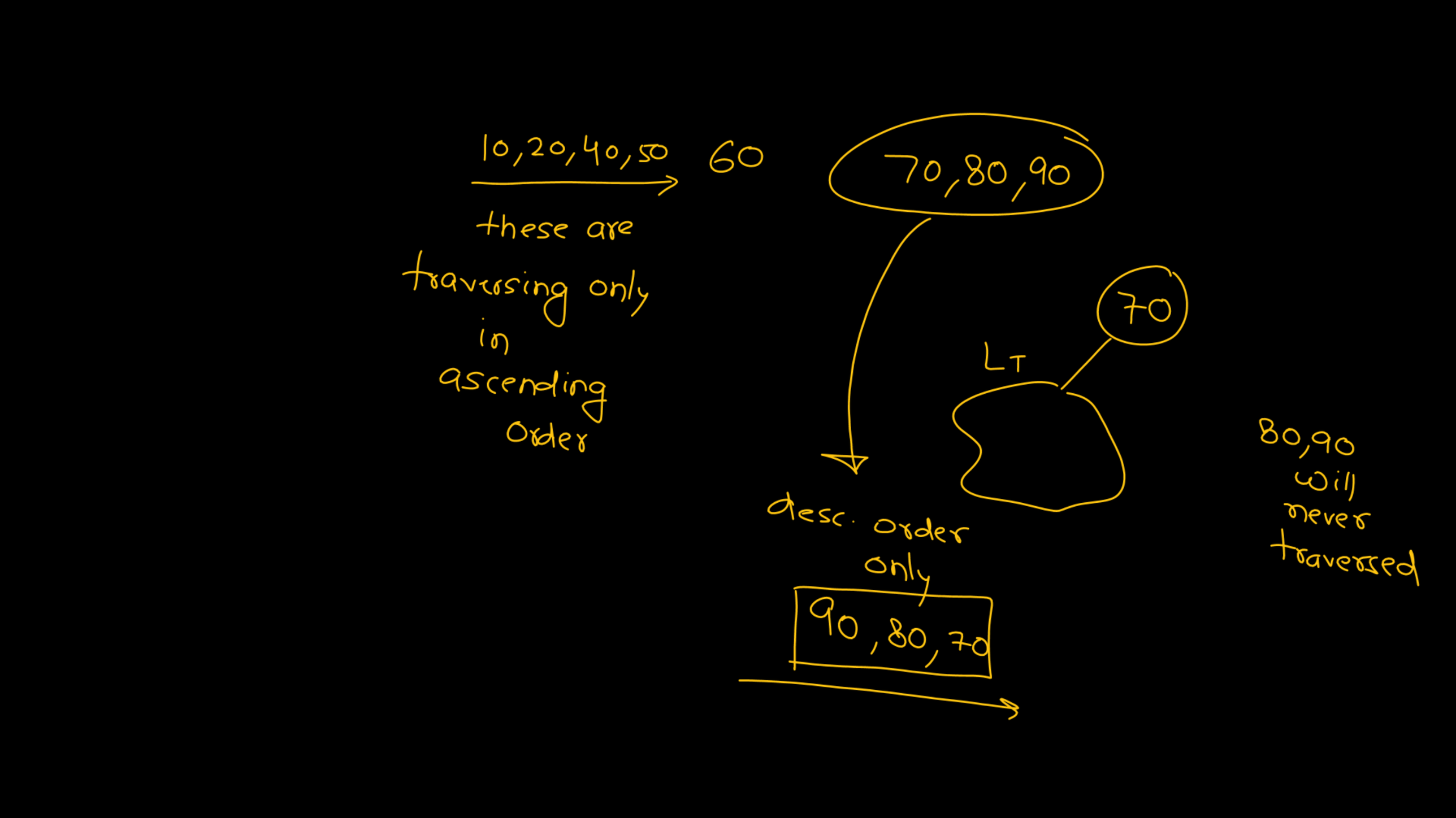
A) 35
B) 64
C) 128
D) 5040

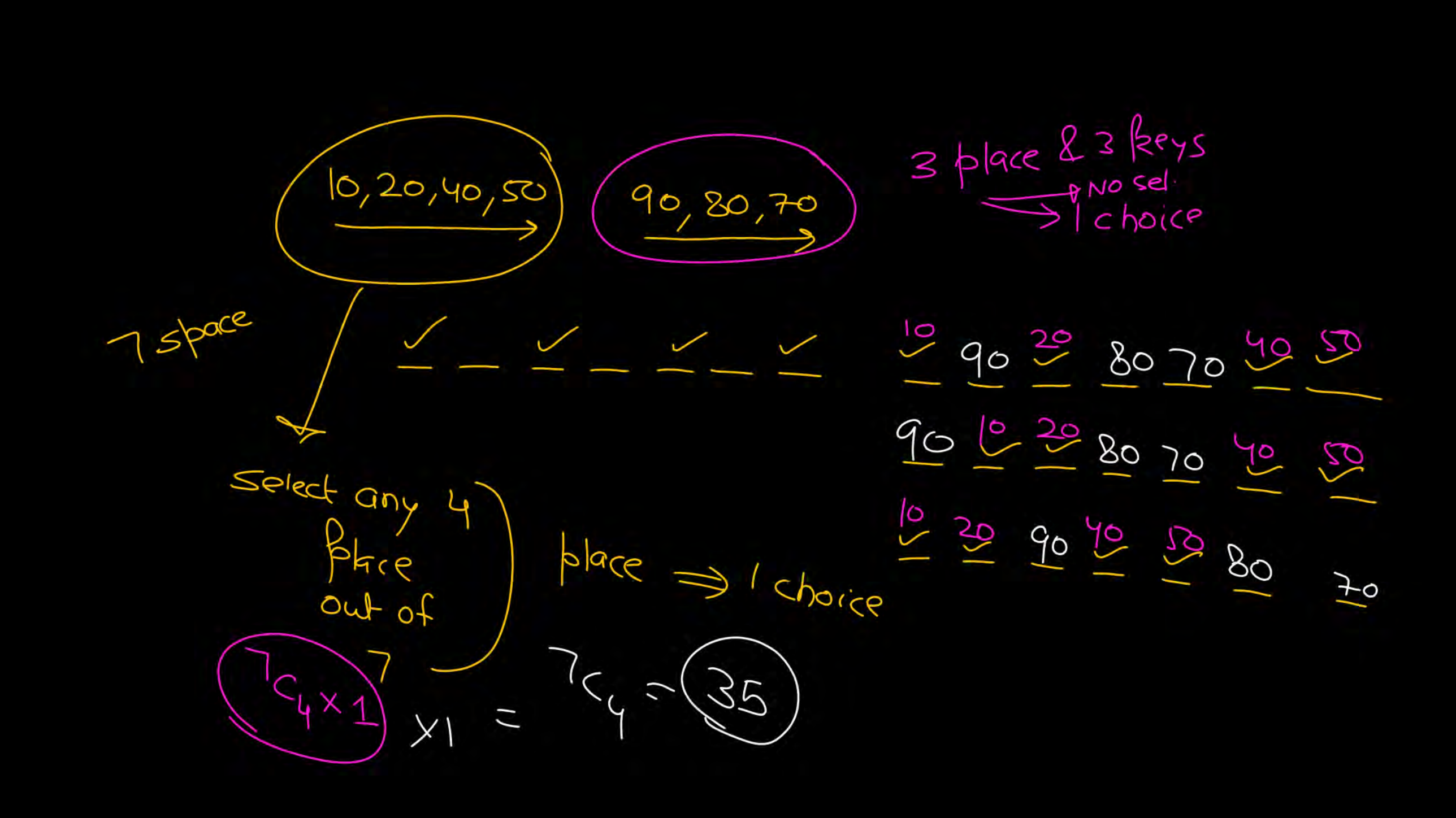
10, 20, 40, 50, 70, 80, 90








10,20,40,50
60
these are traversing only in ascending Order
70,80,90
70
LT
80,90 will never traversed
desc. order only
90,80,70


10, 20, 40, 50
90, 80, 70
3 place & 3 keys
No sel.
1 choice
7 space
Select any 4 place out of 7
place ⇒ 1 choice
7C4 x 1
x1 = 7C4 = 35
10 90 20 80 70 40 50
90 10 20 80 70 40 50
10 20 90 40 50 80 70

PYQs + Coding (other than Gate)

- Graph
- Hashing <2

} Extra classes


THANK YOU GW
SOLDIERS !