

# Linked List - III

→ deKhi

Foundation Course on Data Structures & Algorithm - Part I

## Linked List :-

ip → head



print  
     $i^{th}$  node  
    from end of Linked list

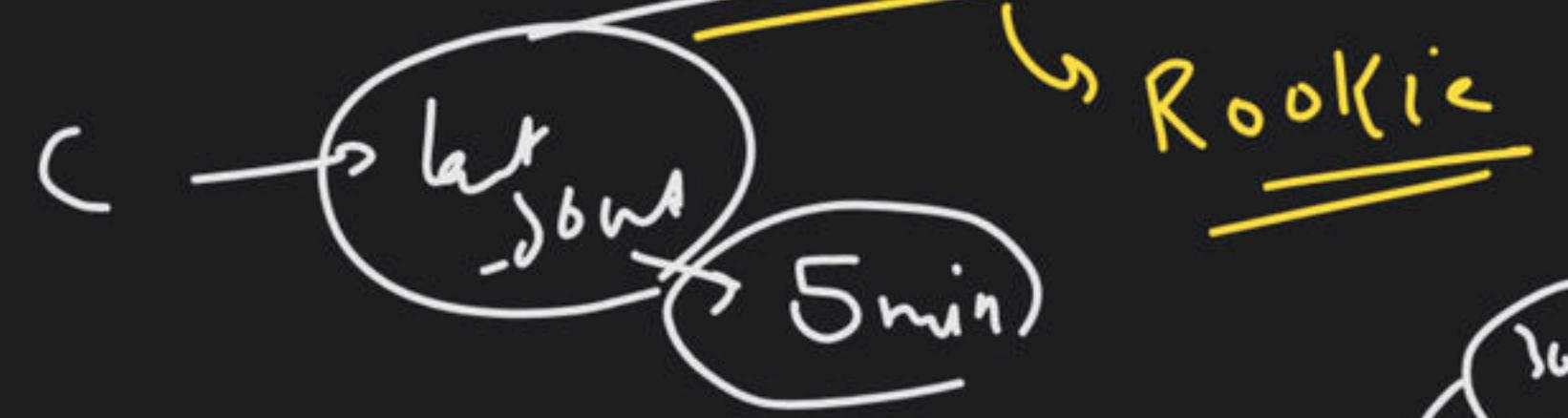
#1

① Reverse LL  $\rightarrow O(n)$

② find  $K^{th}$  node  $\rightarrow O(n)$

$O(n)$

(warm-up question)



36 sec

#2

(1) Length of LL  $\rightarrow$   $n$   $\rightarrow$   $O(n)$

(2) traversal  $\rightarrow$   $(n - k)^m$  node  $\rightarrow$   $O(n)$   $\underline{O(n)}$

#3

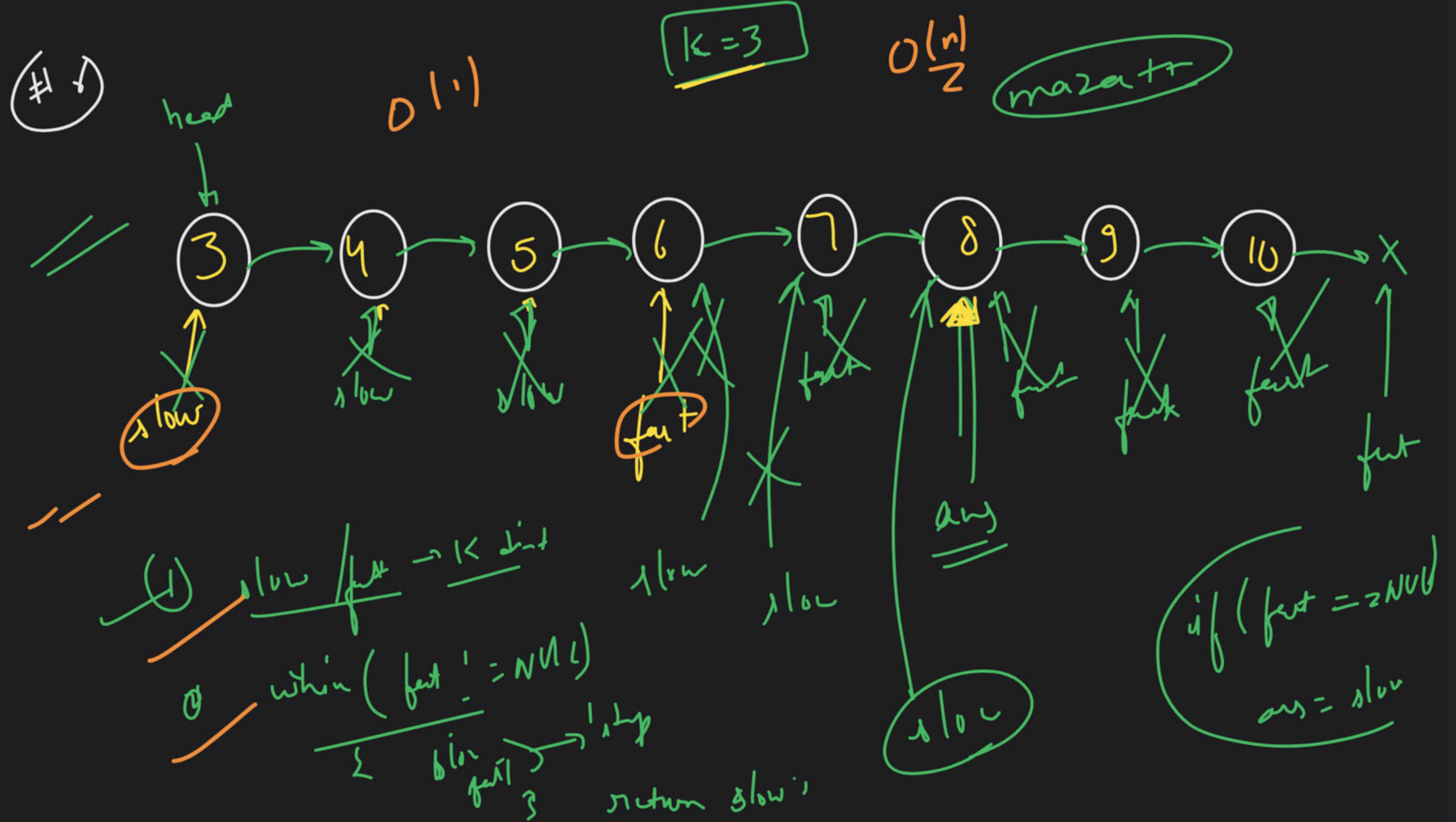
(1) put into array  $\rightarrow$  LL element

(2) arr [ $k - 1$ ] = print

#4

Recursion

Dhanya was  
#5  
2 pointer with  
a gap of  $k$



①

slow = head  
fast = head

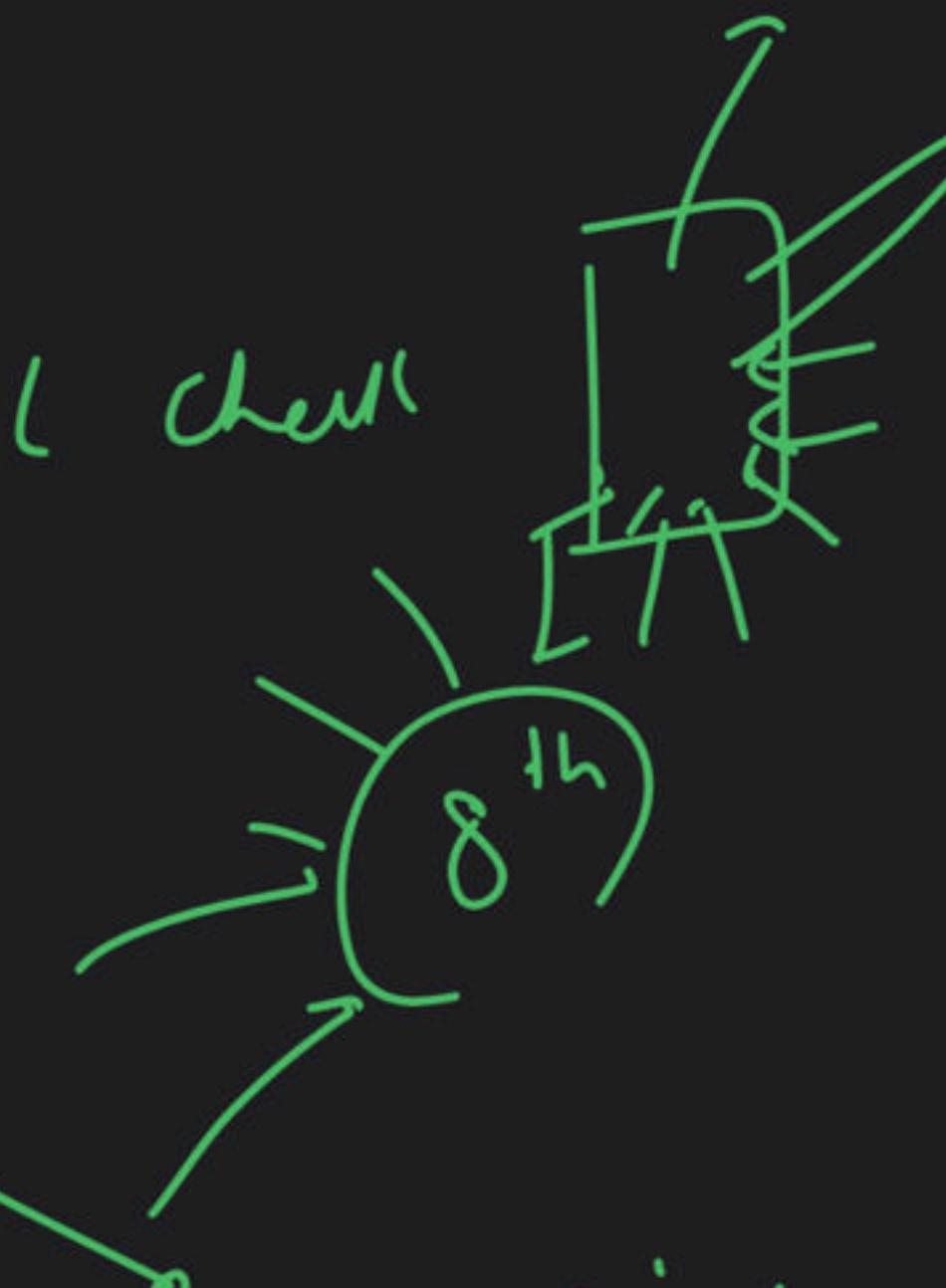
NULL

while ( $K--$ )  
{ fast = fast->next; }

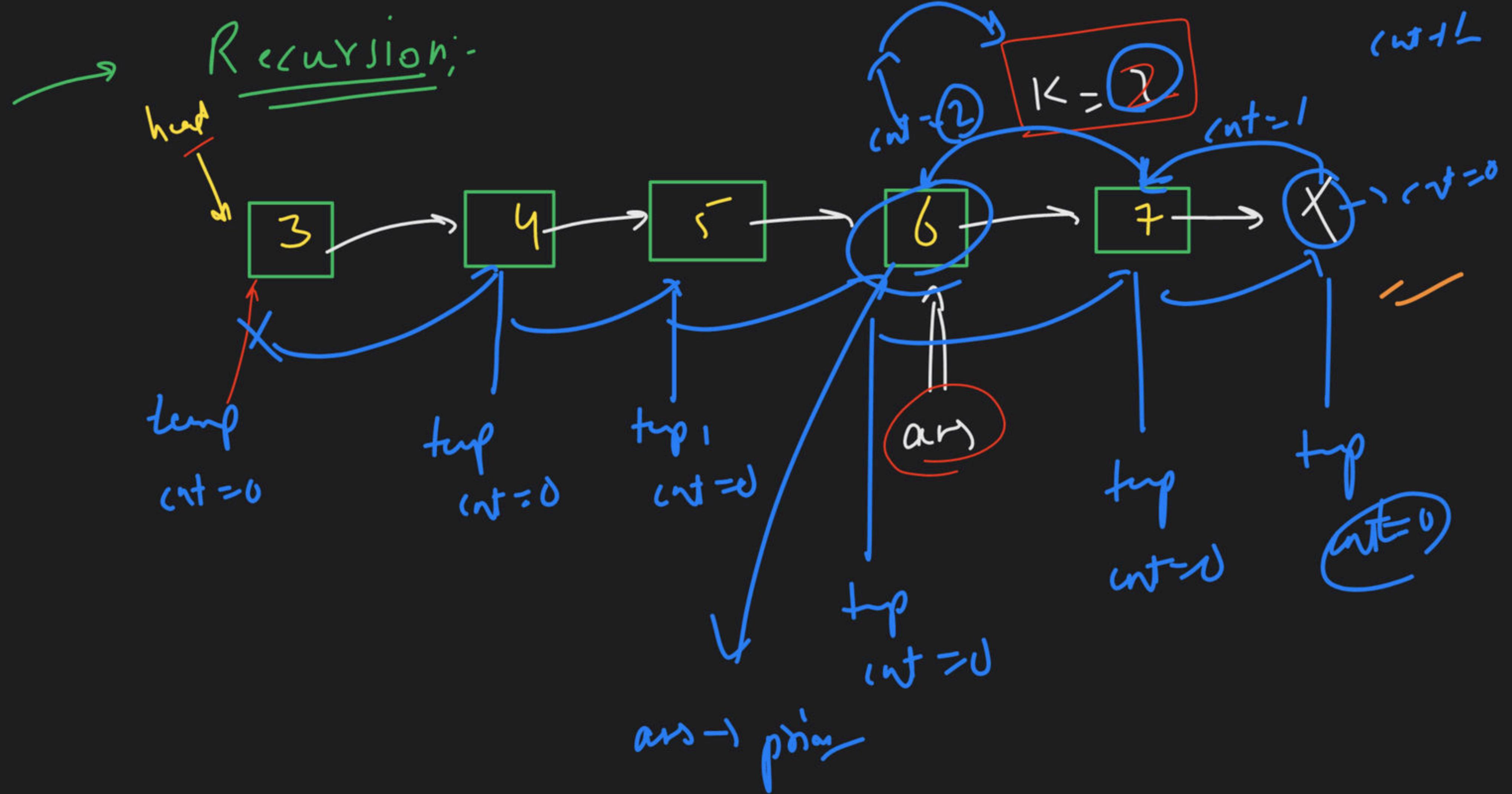
loop K times

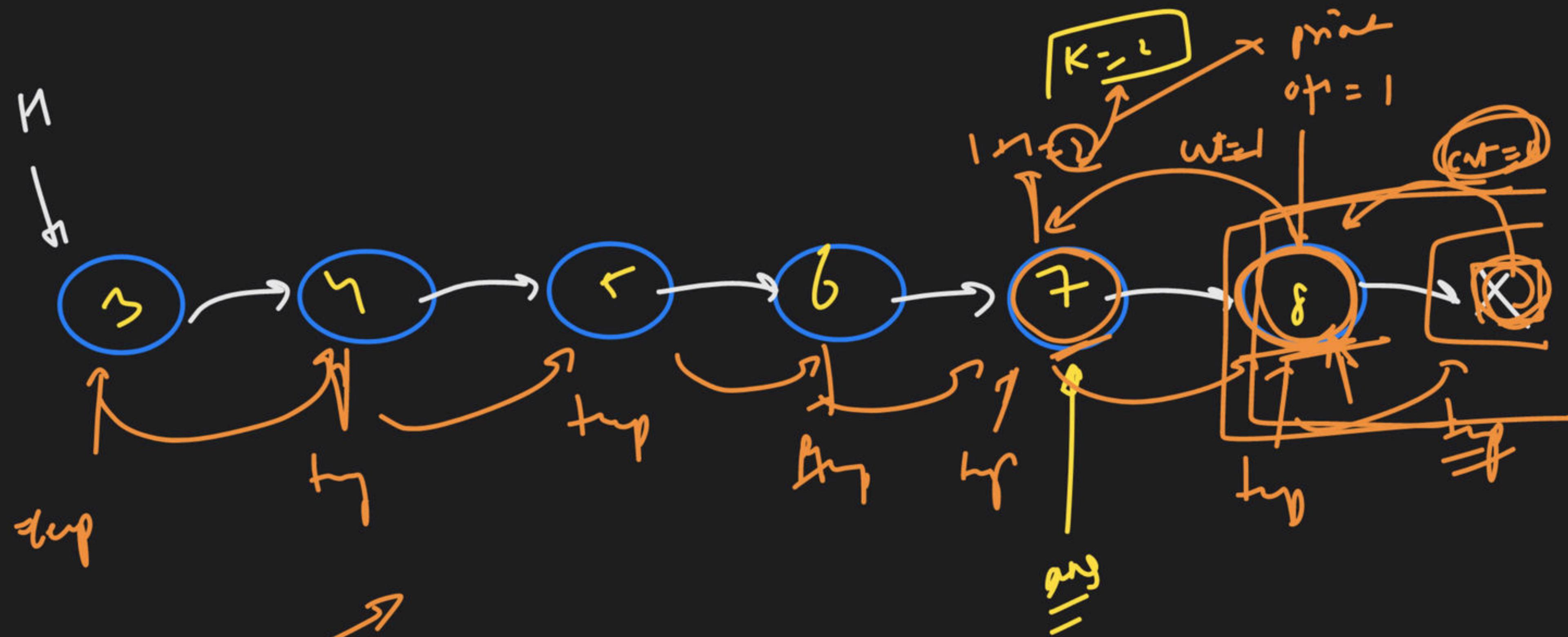
while (fast = NULL)  
{ slow = slow->next;  
fast = fast->next;  
} after slow:

NULL check



while ( $K \neq 0$ )  
{  
   $K--$ ;





$$T \cdot C \Rightarrow O(n)$$

$S \cdot C \rightarrow \delta(n) - k$

①

① Detect

Δ Delete Loop

T-C  $\rightarrow O(n) \rightarrow \text{Vuf}$ )

Meet



100

200

300

400

500

600

700

800

900

1000

1100

1200

1300

1400

1500

1600

1700

1800

1900

2000

2100

2200

2300

2400

2500

2600

2700

2800

2900

3000

3100

3200

3300

3400

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18100

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18300

18400

18500

18600

18700

18800

18900

19000

19100

19200

19300

19400

19500

19600

19700

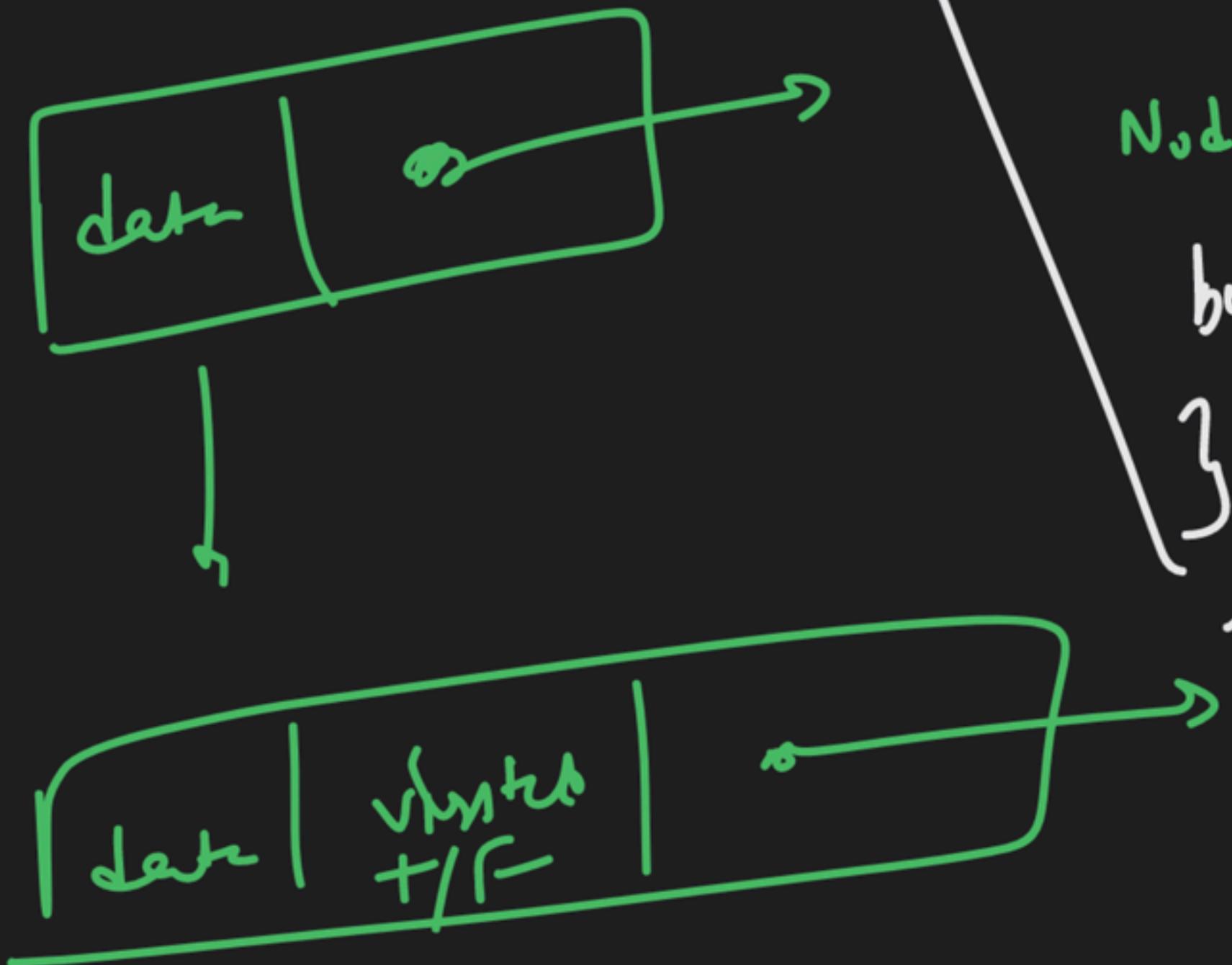
19800

19900

20000

#2

way

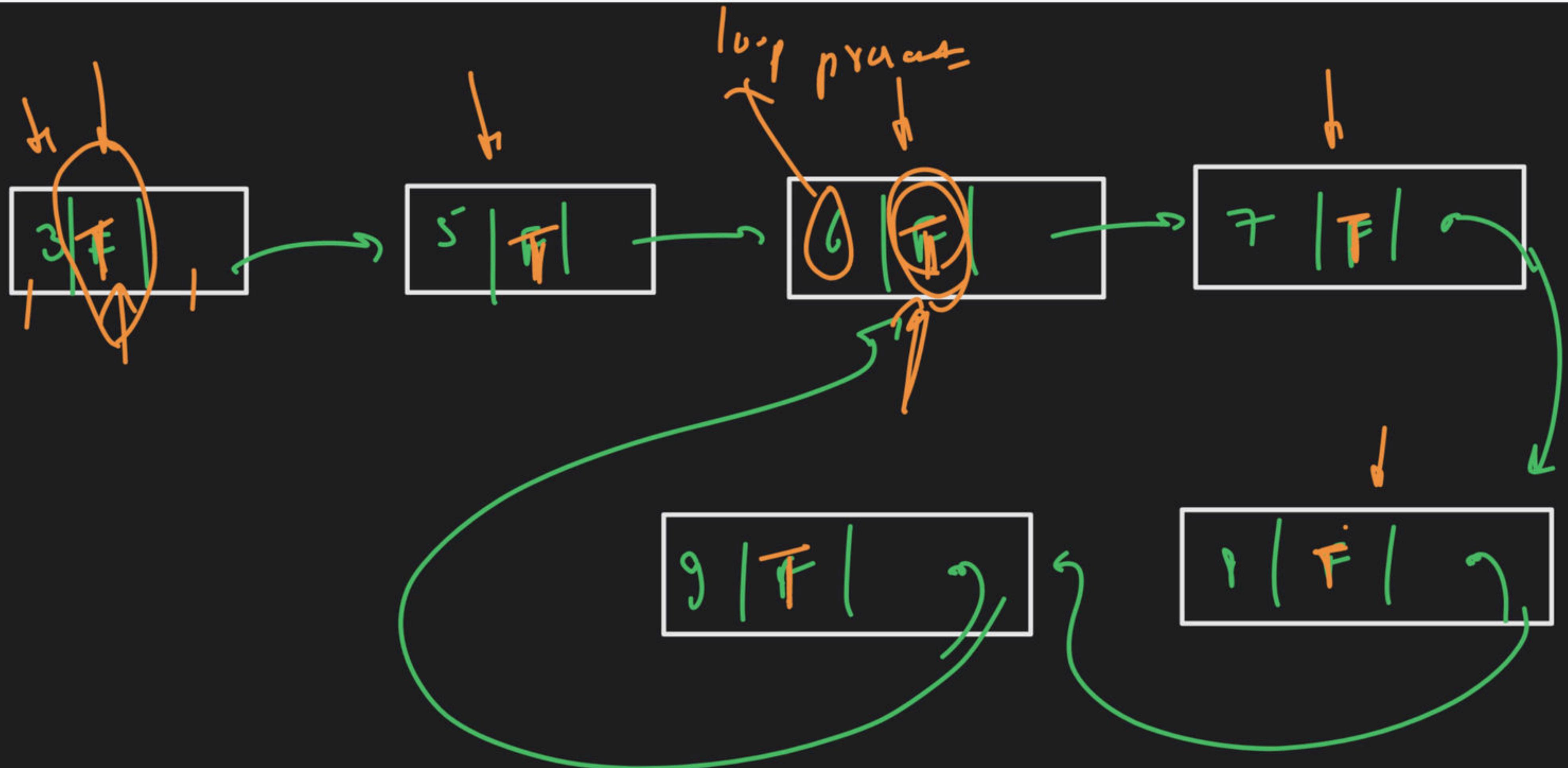


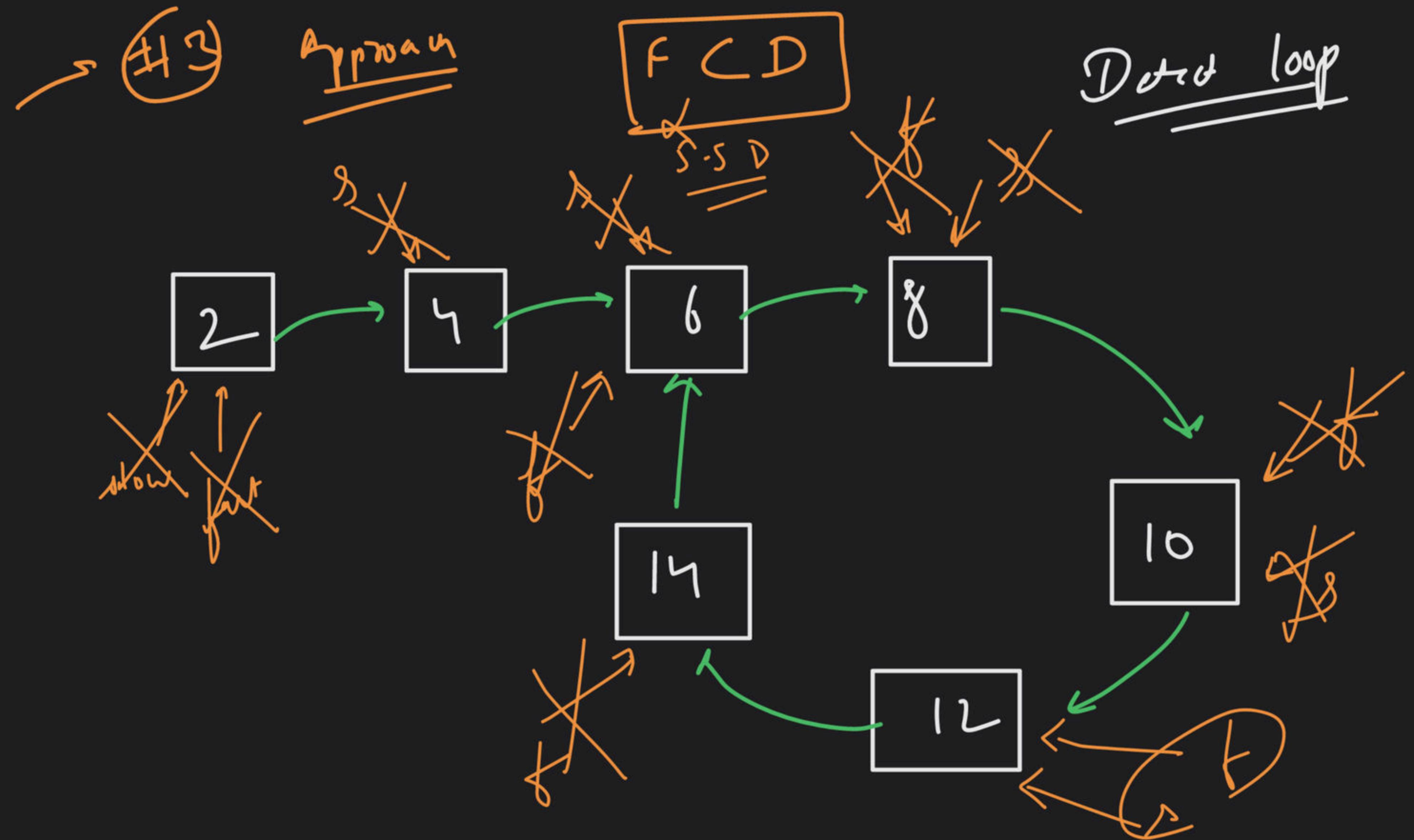
class  
{  
 int data;  
 Node\* next;  
 bool visited;  
}

Necraj → 25

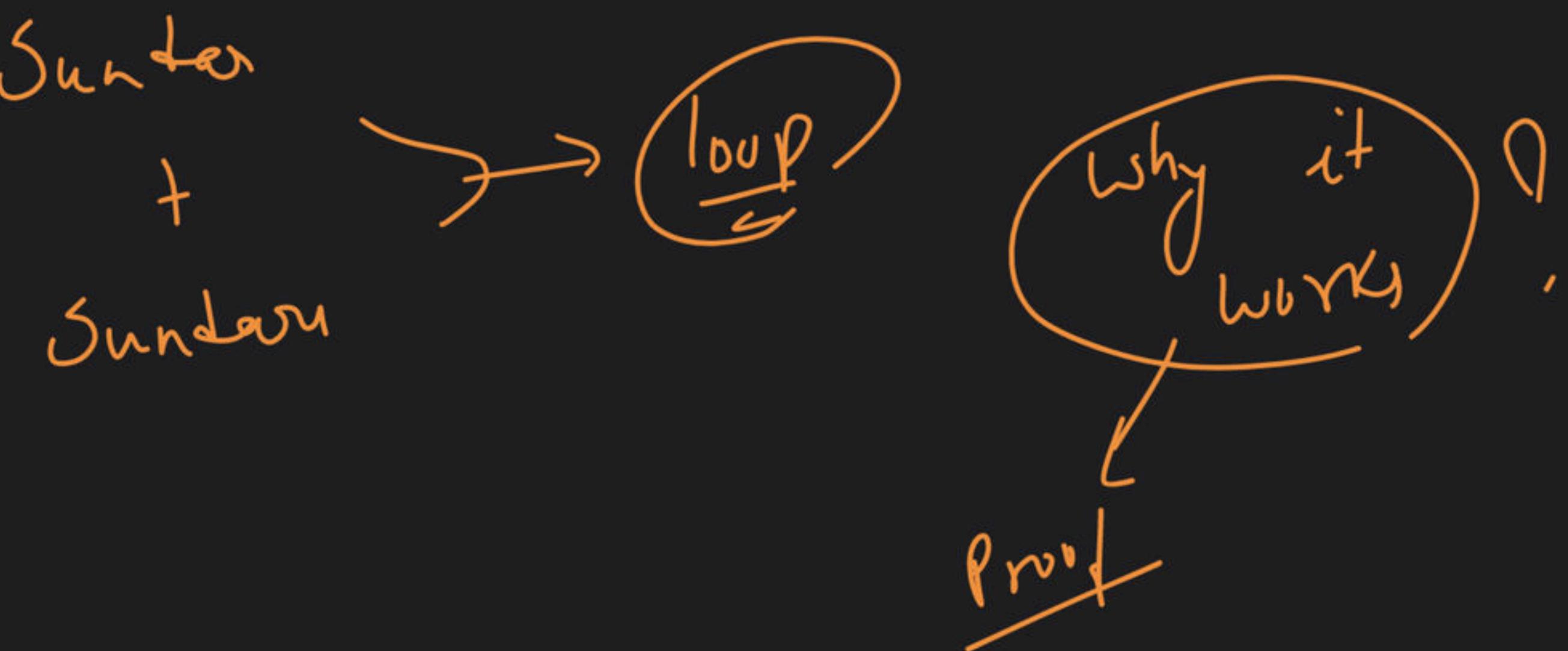
Kohli → 26

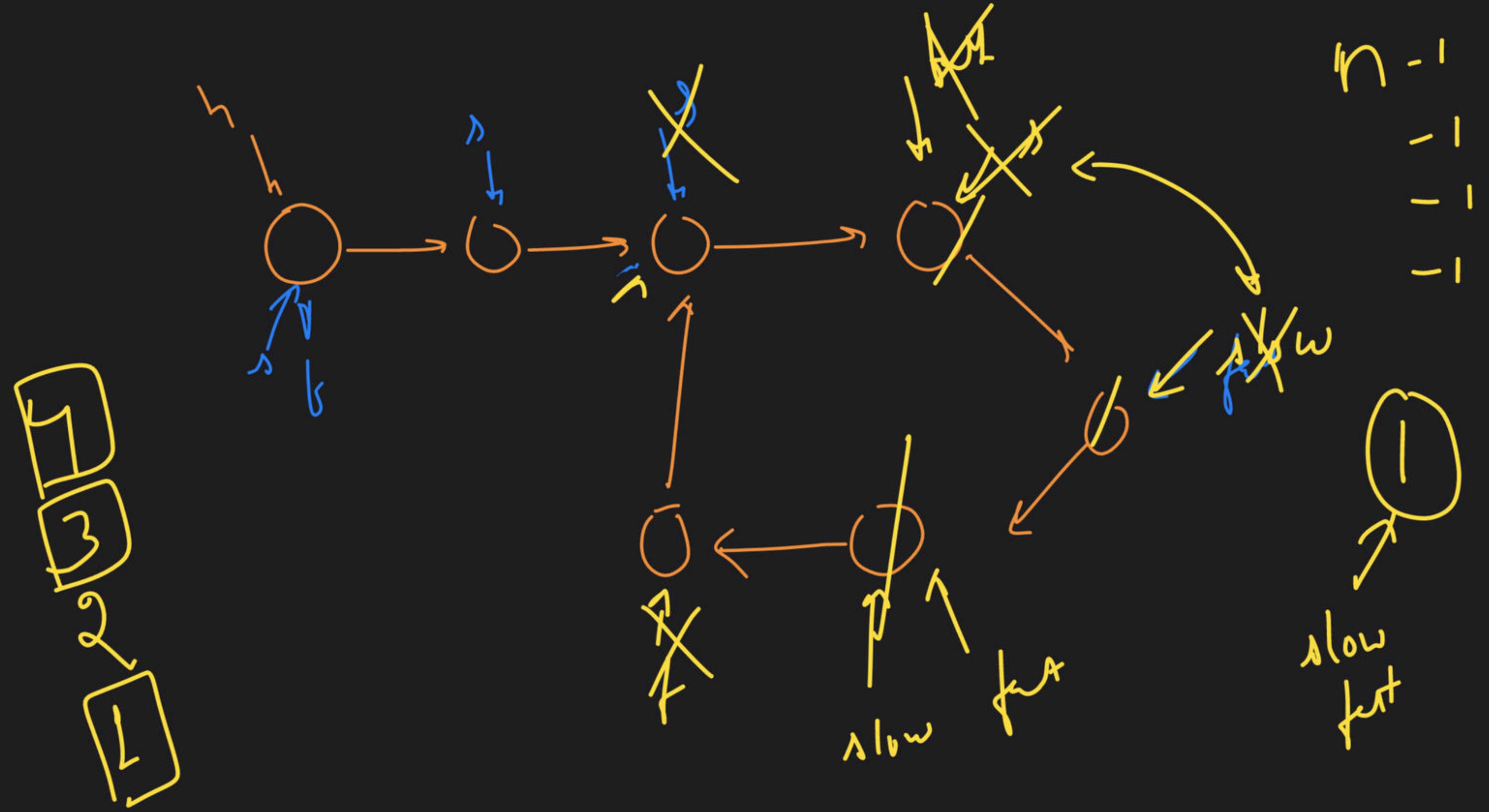
Babbar → 301

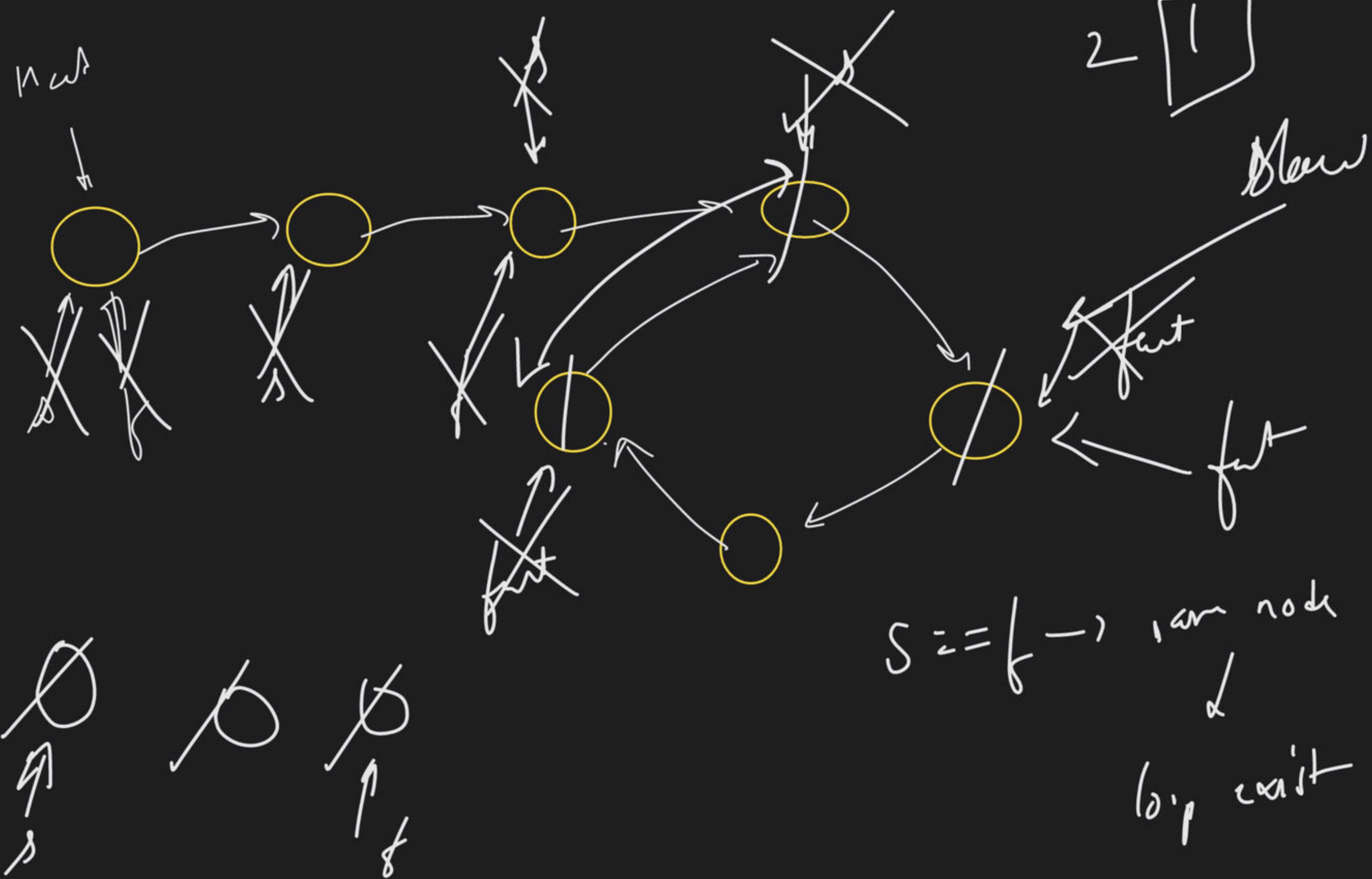




# ① Detect a loop







while ( $\text{fat} \neq \text{NULL}$ )

    f 4

$\text{fat} \rightarrow \text{head} = \text{NULL}$

Step

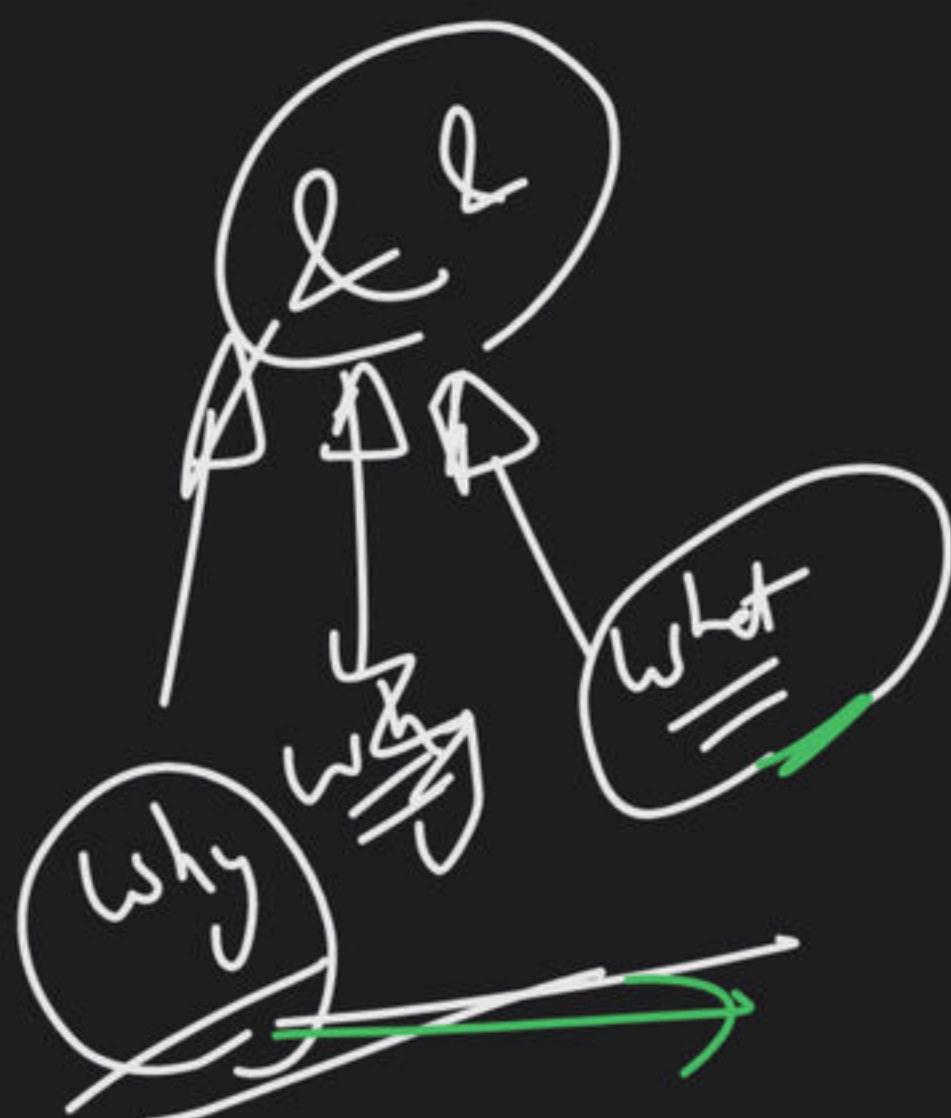
-1

$\text{fat} = \boxed{\text{fat} \rightarrow \text{null}}$

n  
- 1

- 1  
- 1  
- 1

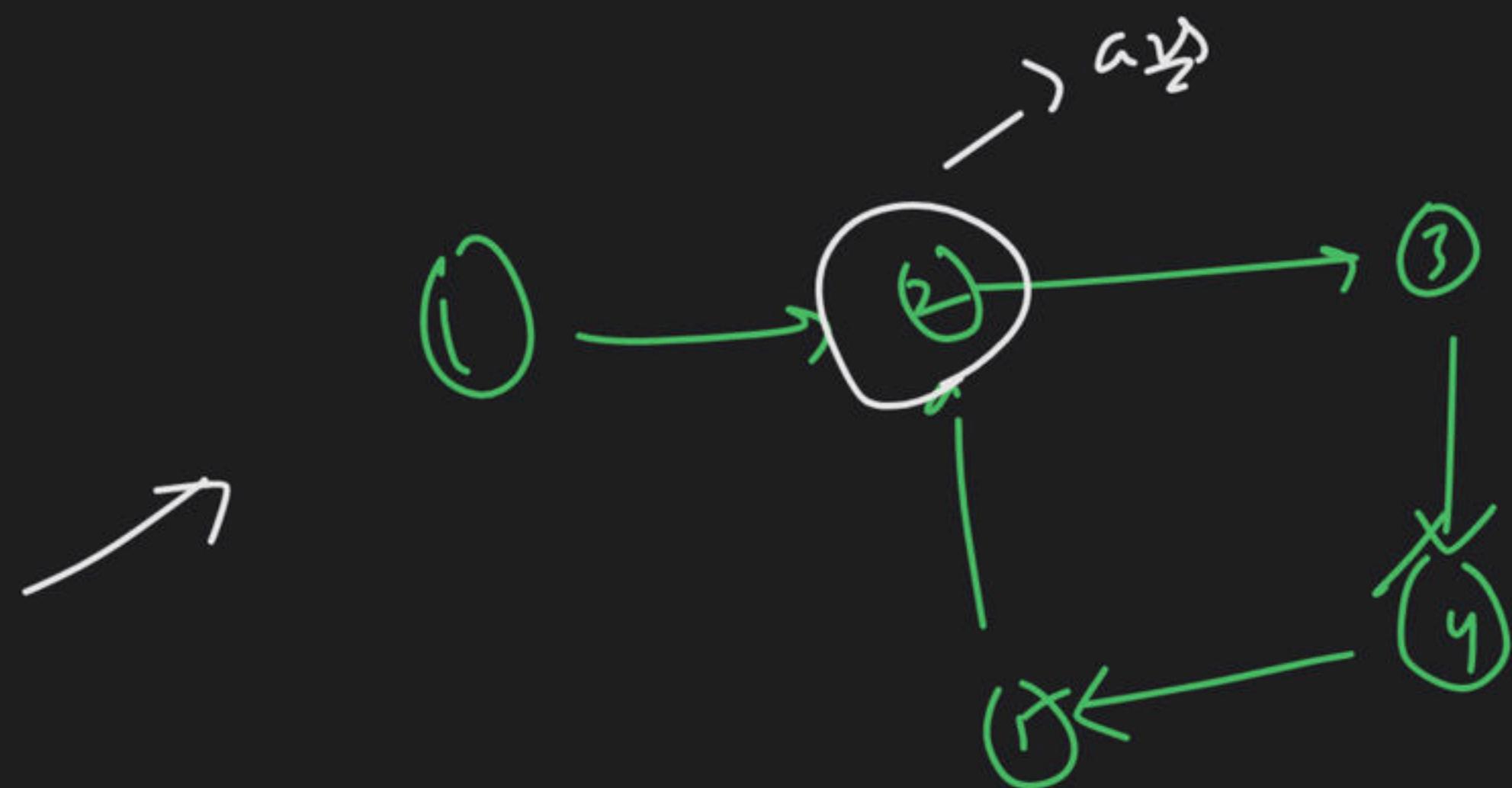
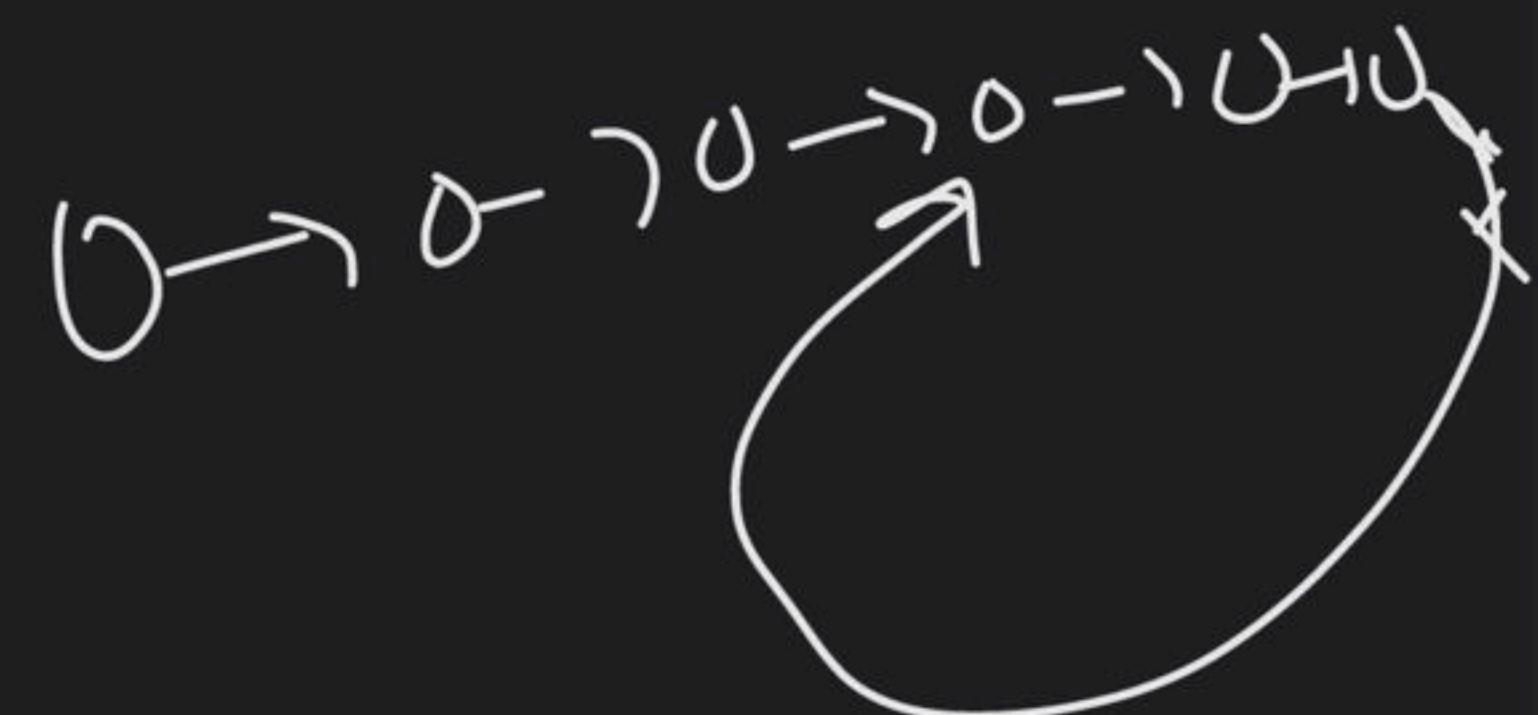
NULL  $\rightarrow \text{null}$



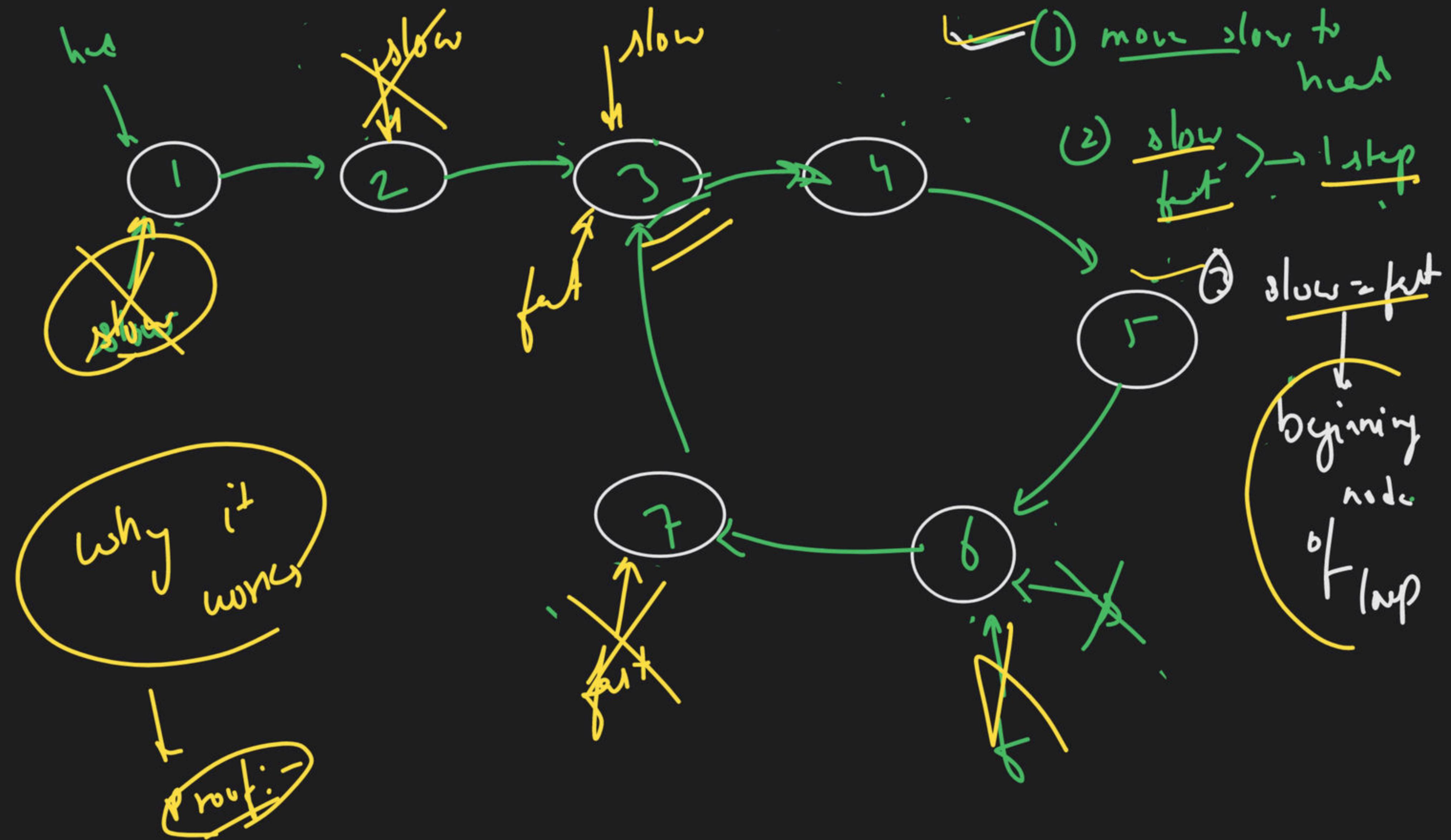
0

① elctrn loop

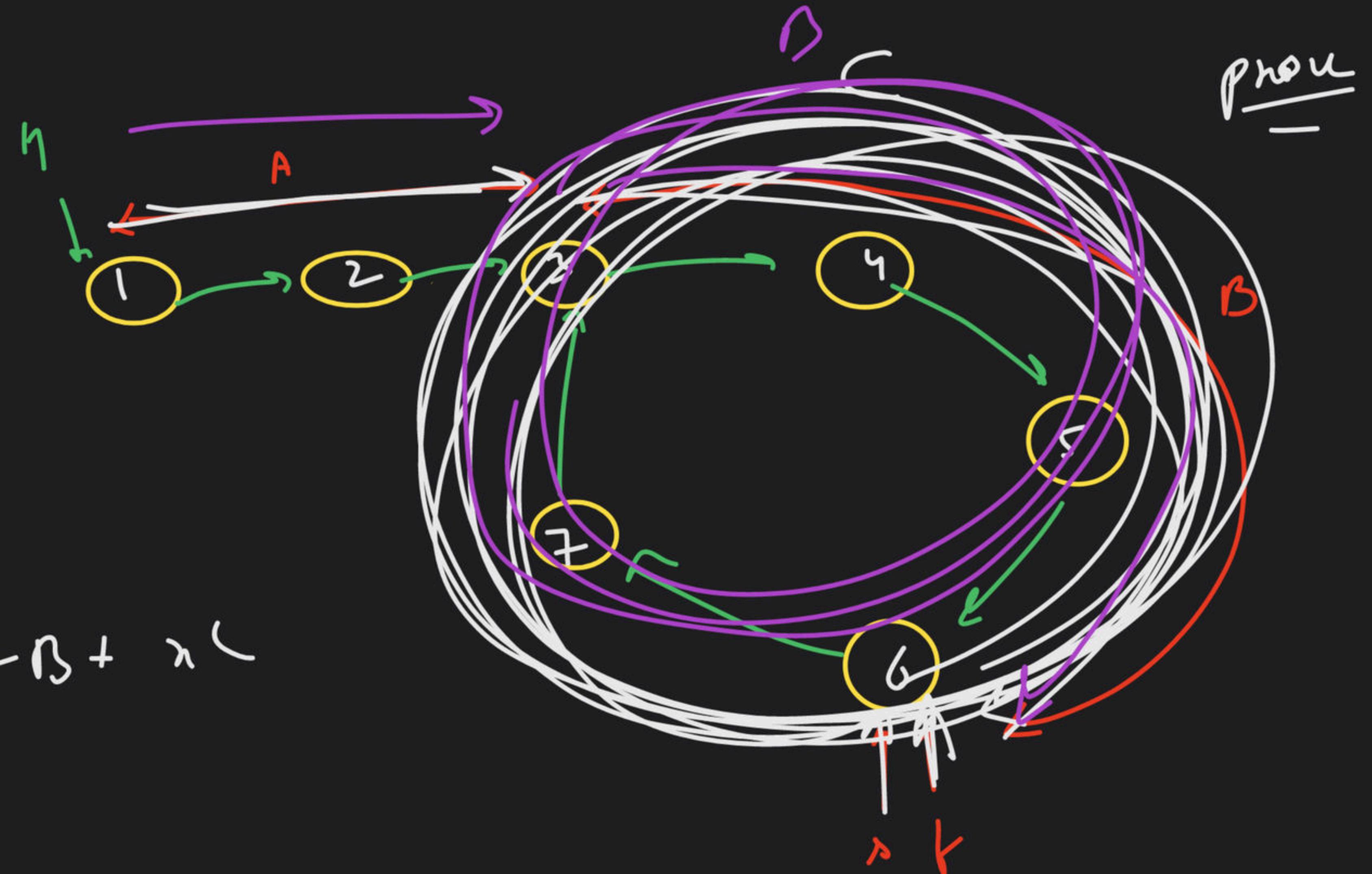
Beginning loop —  
node



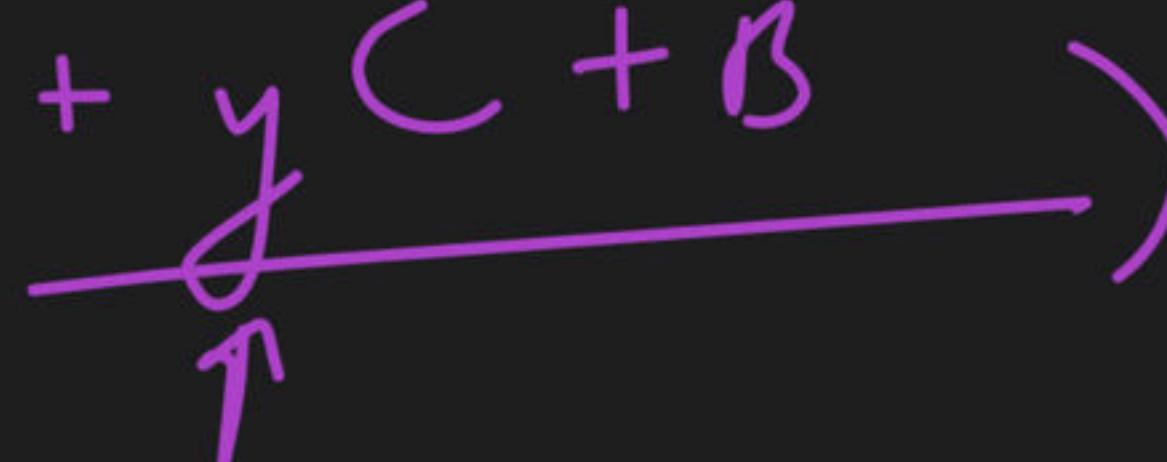
slow fast  
↓  
fast

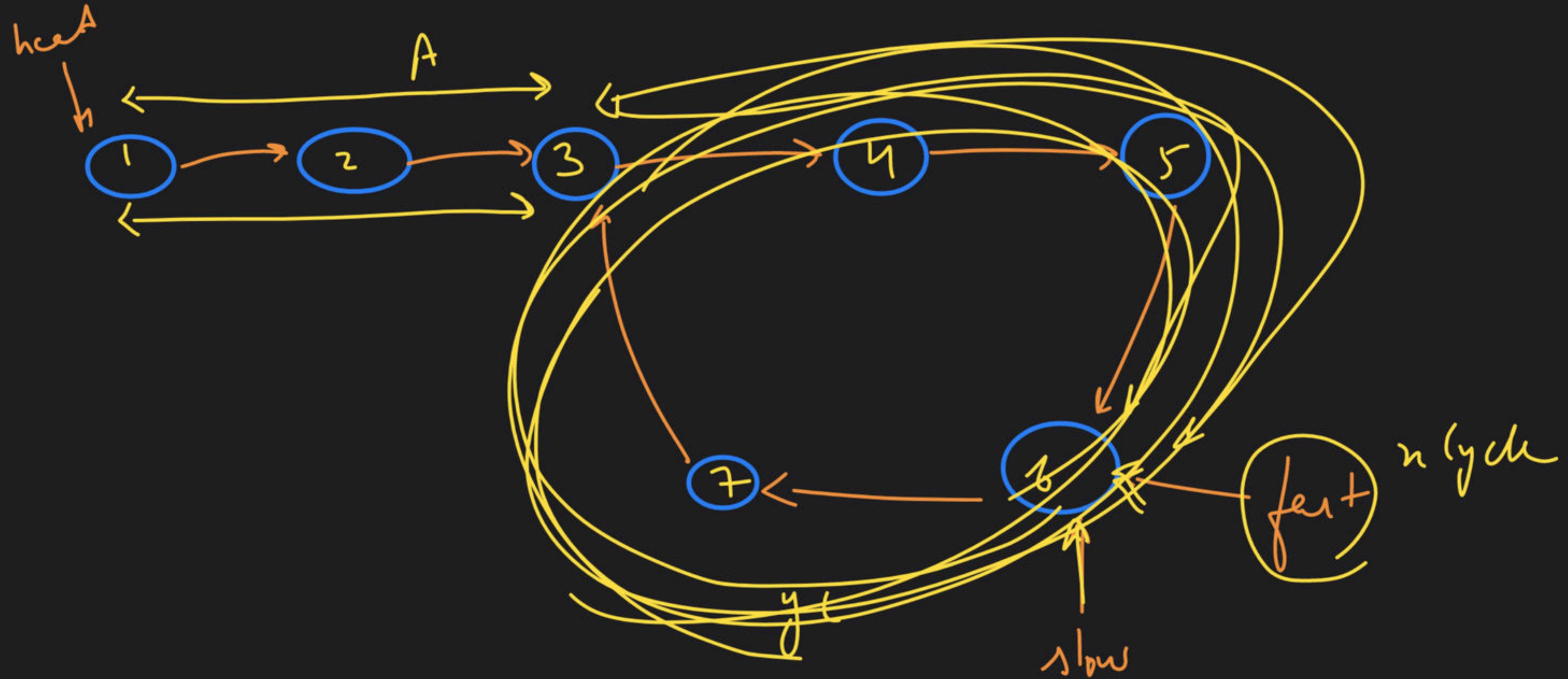


$A + \beta + \gamma$



Distance travelled = 2 \* Distance travelled  
by fast trv by slow trv.

$$A + B + \frac{y}{n} C = 2 * (A + yC + B)$$




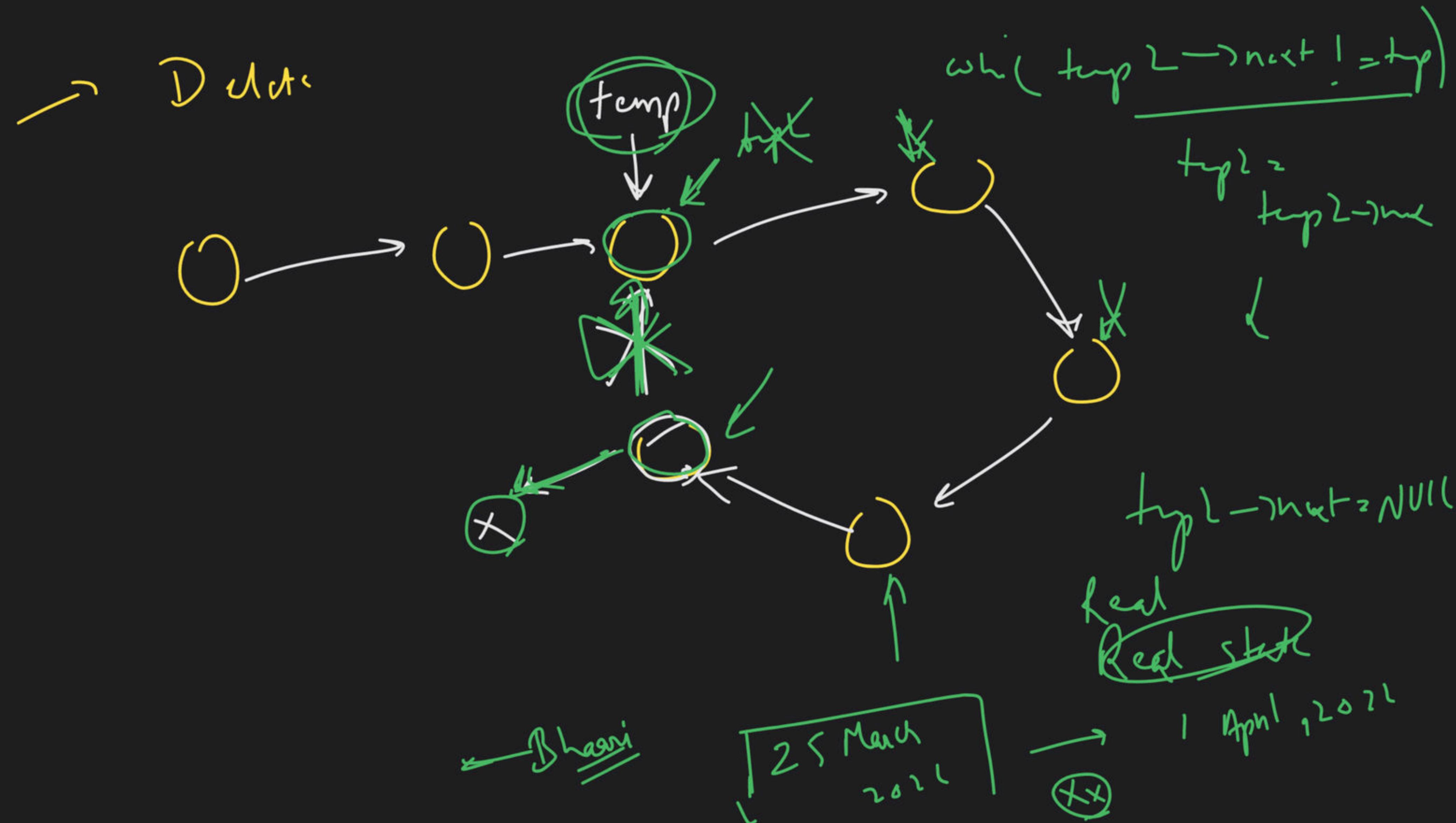
$$A + \beta + nC = 2^{\alpha} (A + \beta + y^C)$$

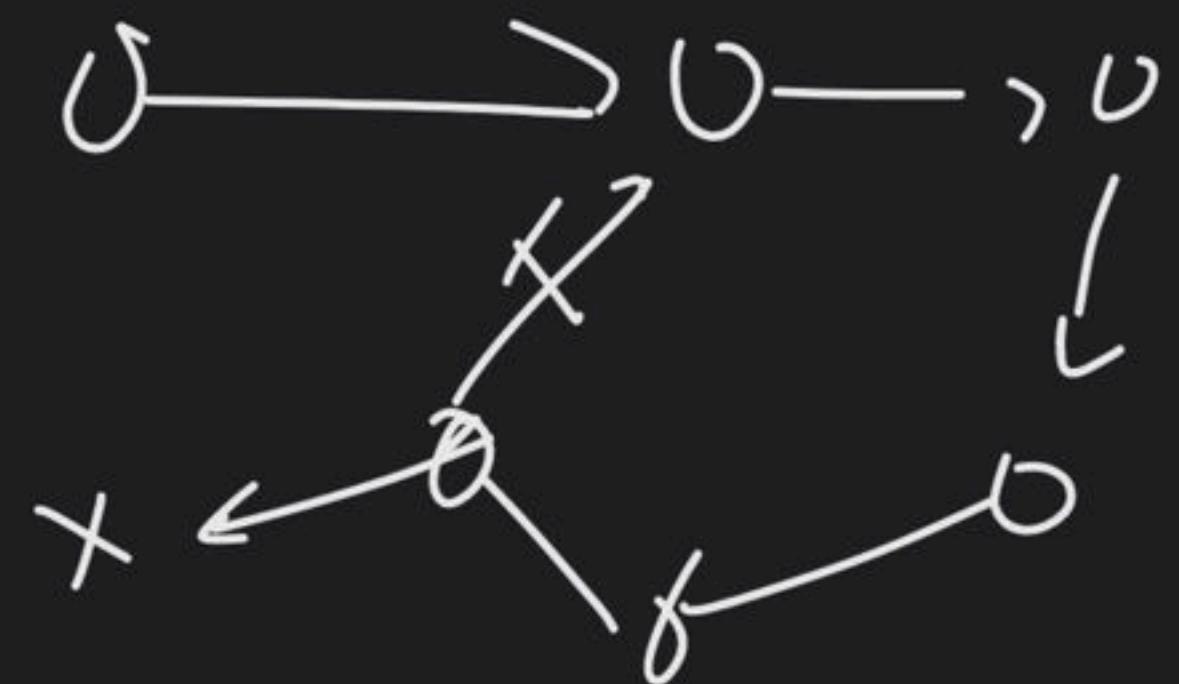
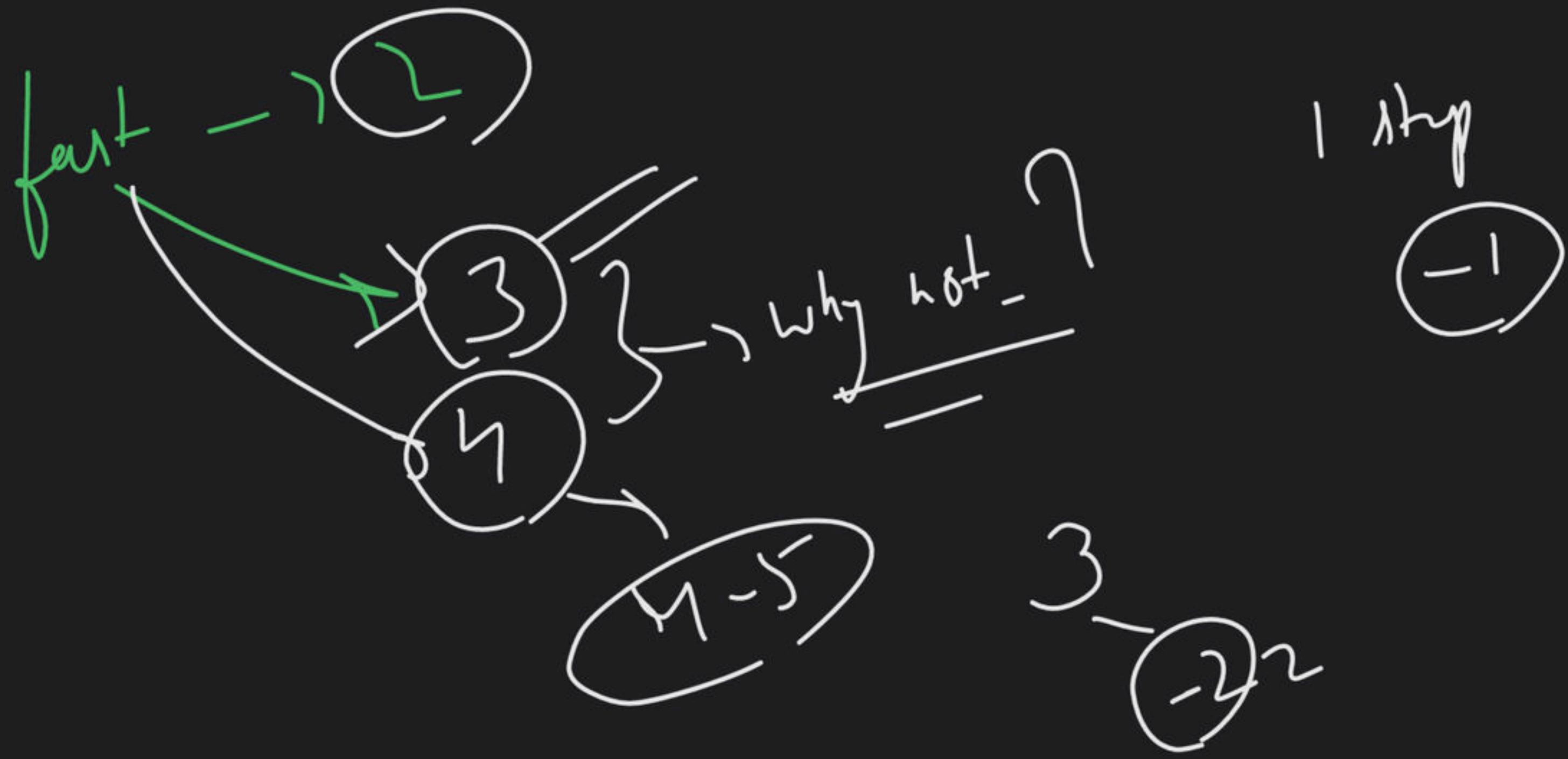
$$A + \beta + \gamma C = 2A + 2\beta + \gamma C$$

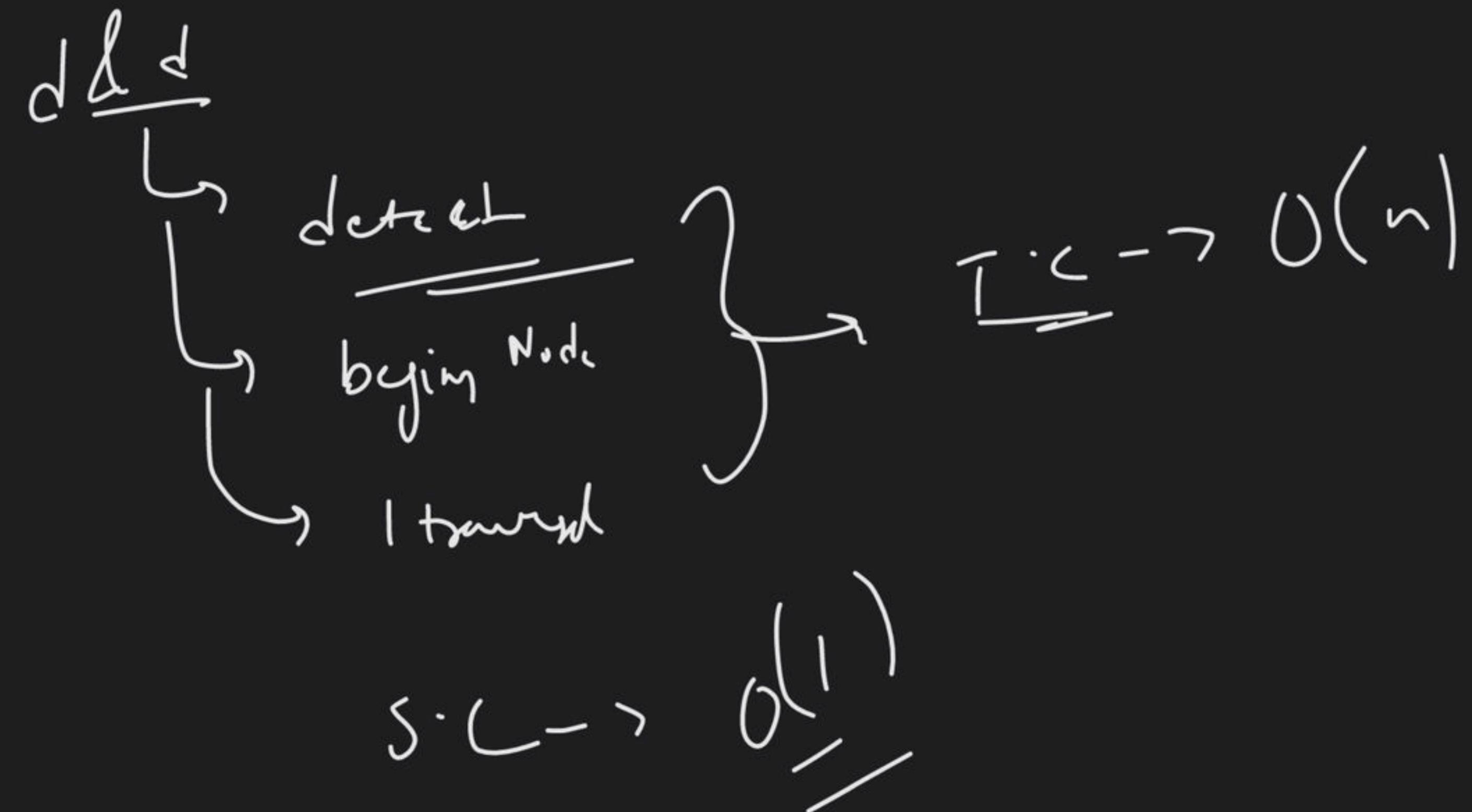
$$\gamma C - \gamma C = A + \beta$$

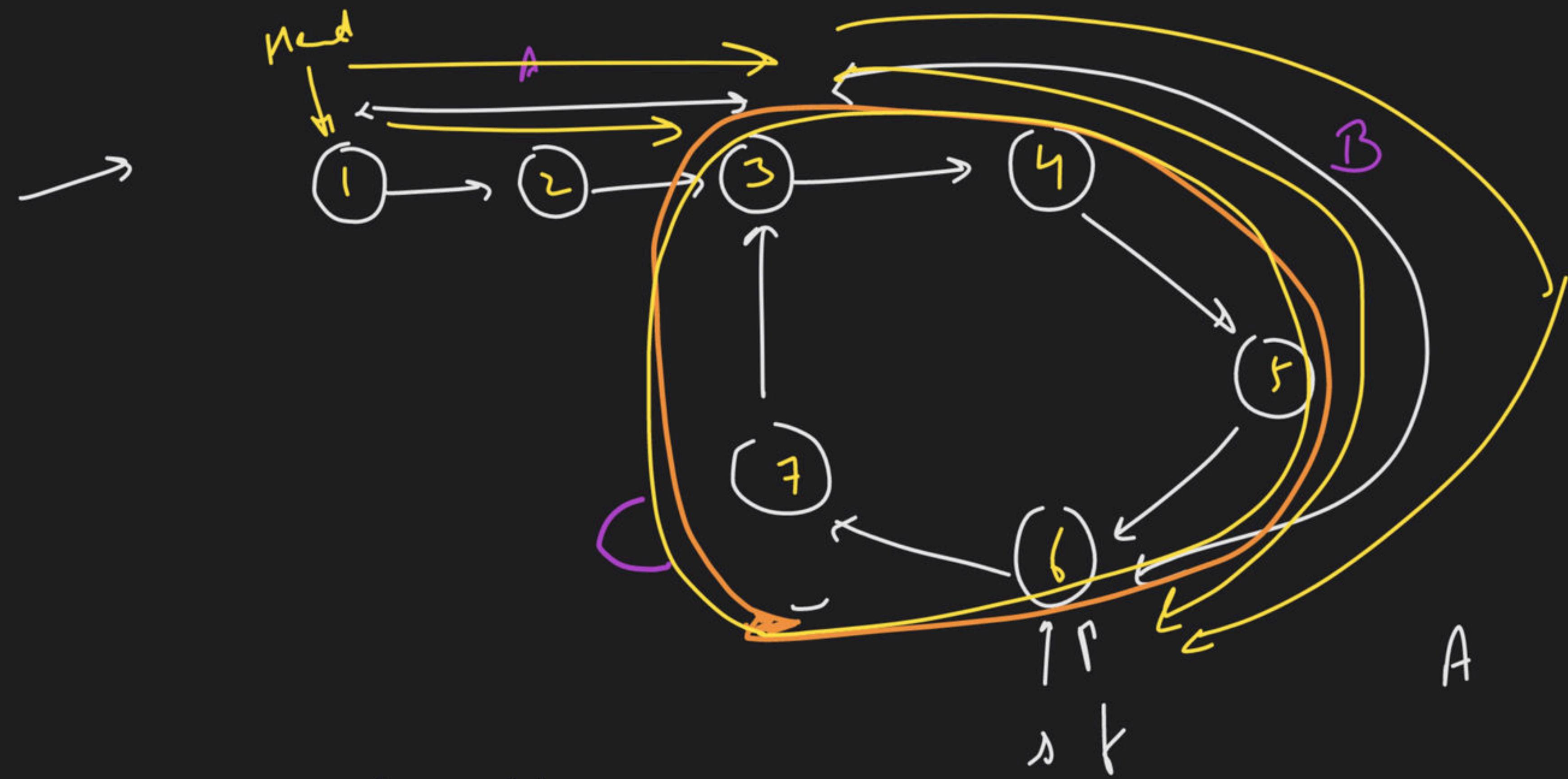
$$(\gamma - \gamma) \otimes C = A + \beta$$

$$A + \beta = \gamma \otimes C$$









Distance travelled  
by fast pty = 
$$\boxed{A + B + nC}$$

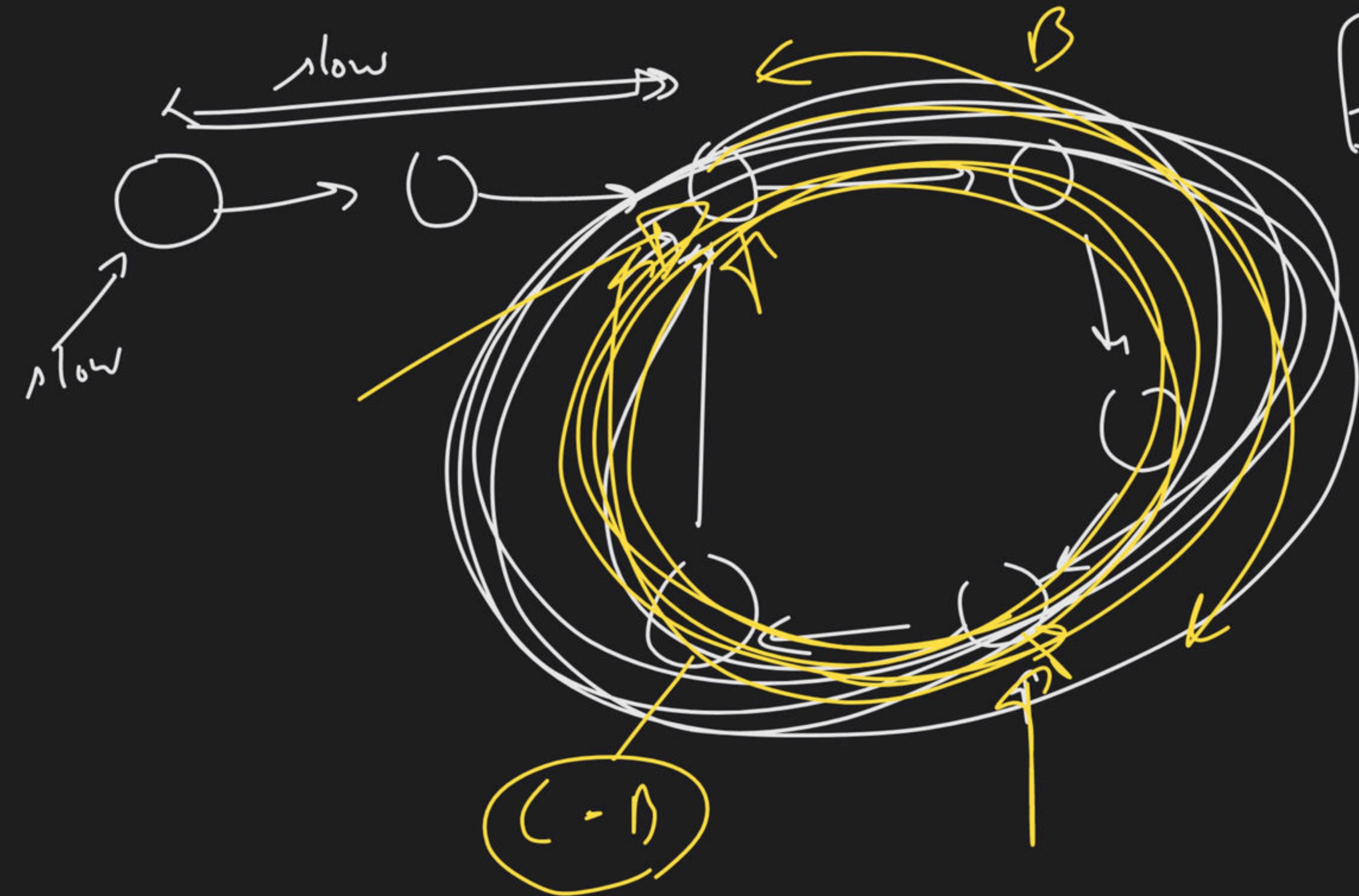
Distance travelled =  $A + \beta + mC$   
by slow pt.

$$Distance_{slow} = 2 * Distance_{fast}$$
$$A + \beta + nC = 2 * (A + \beta + mC)$$

$$A = KC - \beta$$

$$A + \beta = \frac{(n-m)}{K} * C$$

$$\rightarrow A + \beta = K * C$$



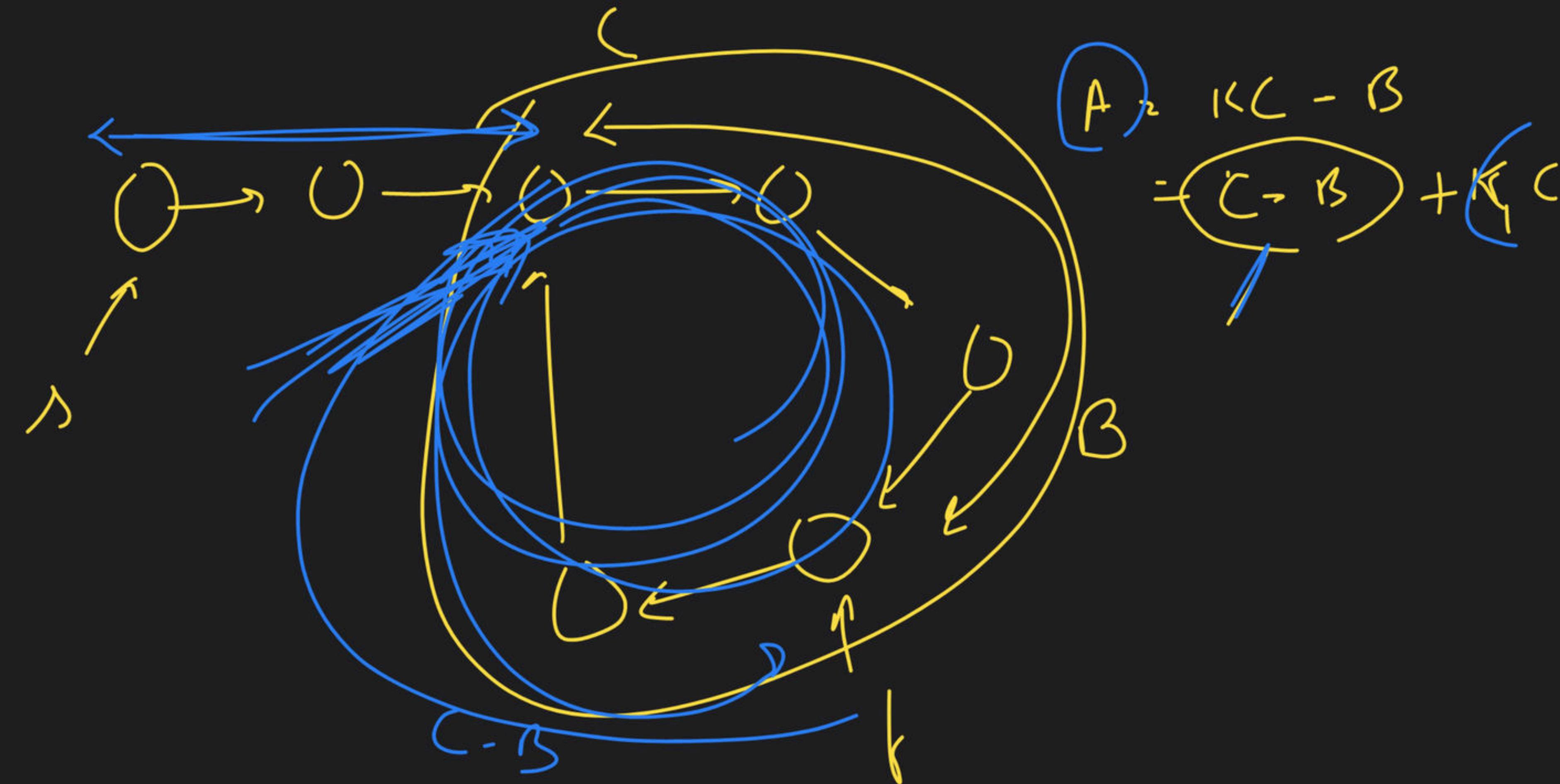
$$A - K C - B$$

=

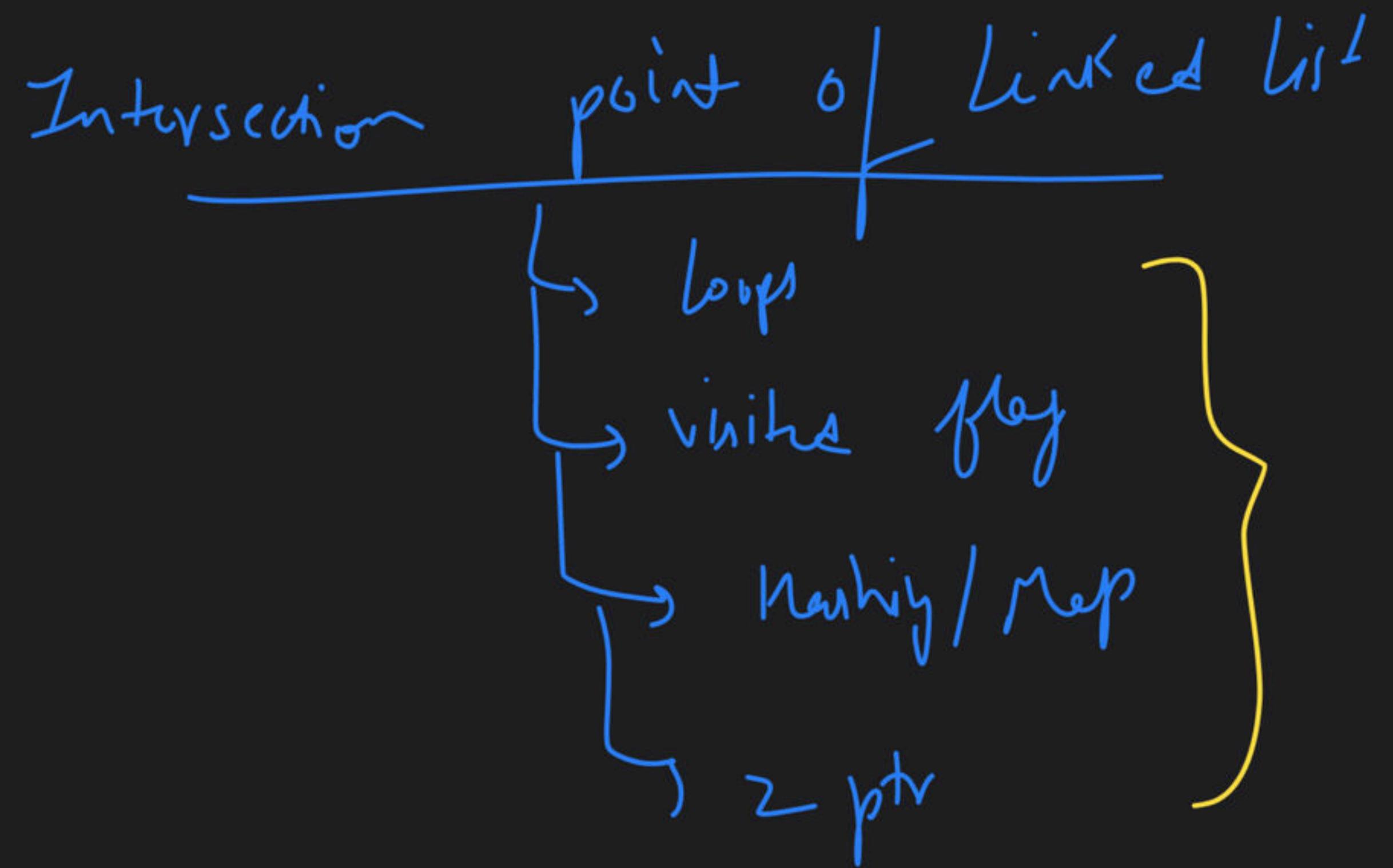
$$k_1 C$$

+

$$C - B$$



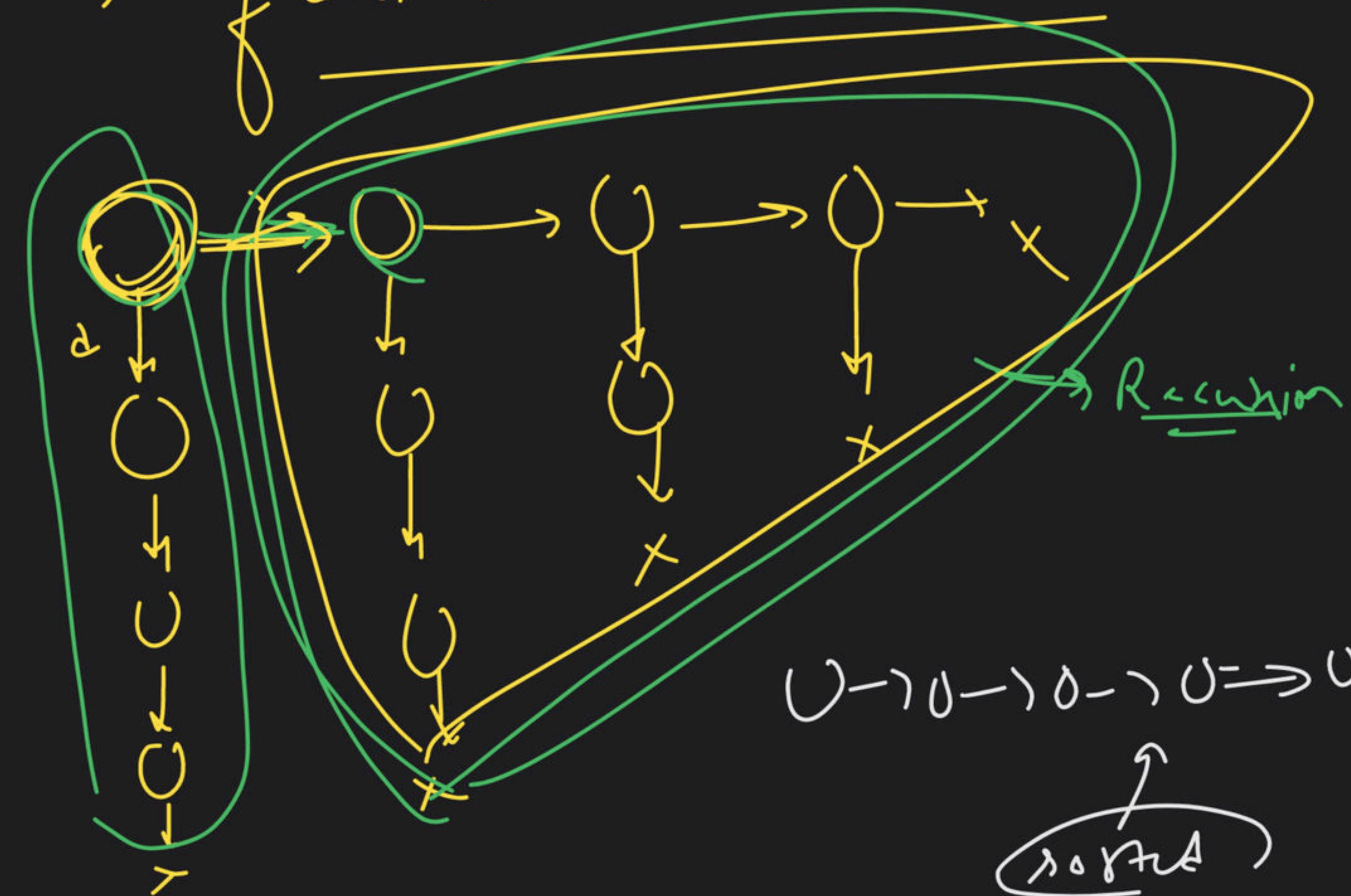
$H \setminus w$



$\text{N} \mid \omega$  R

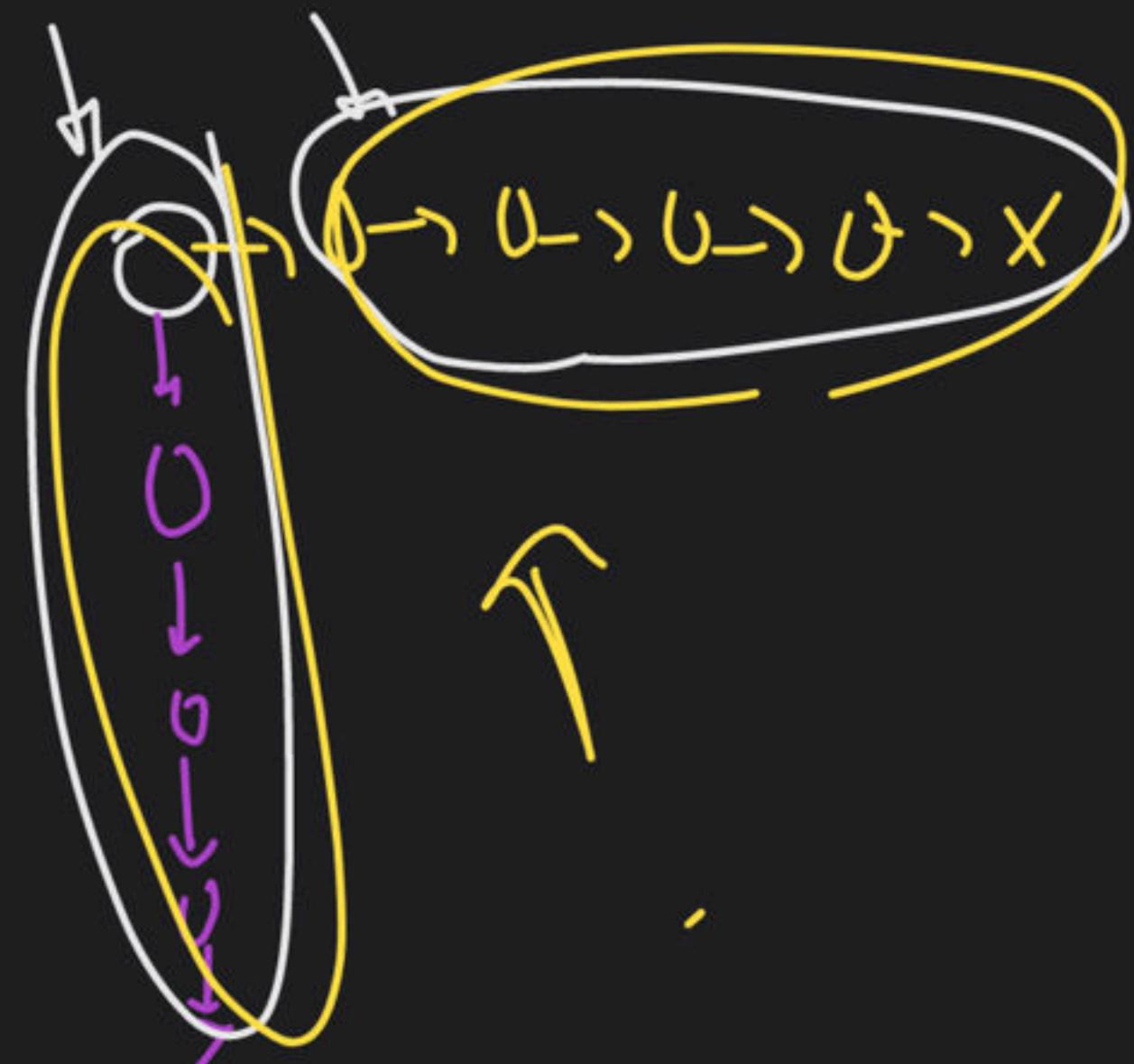
hex<sup>+</sup>  
dow

of lattice a linked list



$U \rightarrow U \rightarrow U \rightarrow U \rightarrow U \rightarrow U \rightarrow U \rightarrow U$

loop



// B.C

```

if (root == NULL) || 
    root = NULL // root;
return flatten (root->right);
    
```

Node \* ans =

$\leftarrow \text{root} \rightarrow \text{right} = \text{ans}$

root = mcrng (root, root->right)

return root;

change  
hexL p11  
down ptr

(1) Remove duplicates from sorted | Unsorted LL

(2) Add | to LL

(3) Add 2 numbers in jy LL

(4) Clone LL with Random ptr

Clone Linked List with Random pointer



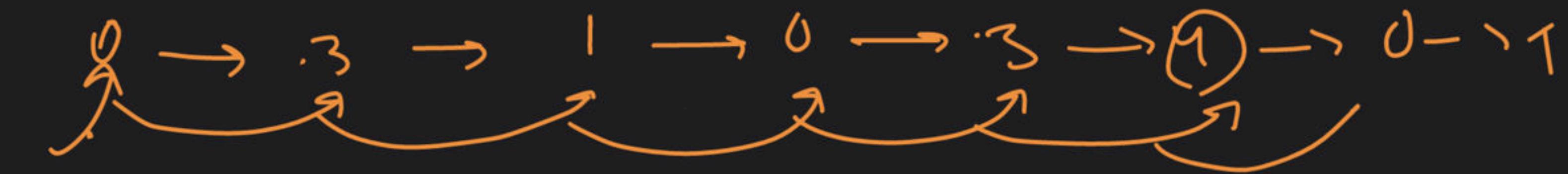
① Dots in nodes after n nodes



```
mySort( )  
{  
    // O·C  
    Node * mid = getmiddle( );  
  
    // If  
    // Node^top > mid->next  
    // Node^top = mergeSort( head, null )  
    Node * left = mergeSort( head, mid->next );  
    Node * right = mySort( mid->next );  
  
    } mySort( left, right );
```

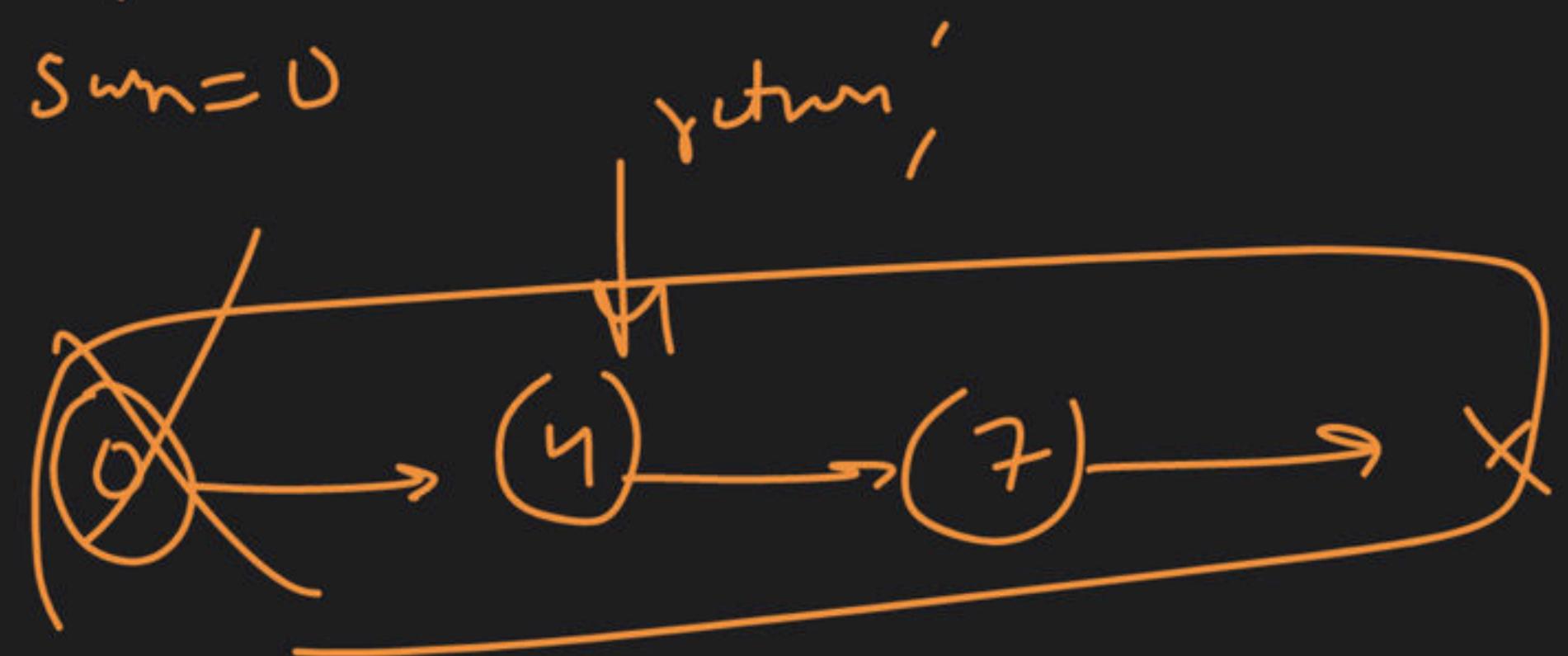
→ merge Nodes in between U

htw



start State  
n

sum = 0



→ Recursion alternate K node

why QS preferred for Arrays &

why MS preferred for LL

SE → interview → OYO → LL } ↗ dp  
palindromic partitioning → n } MS

