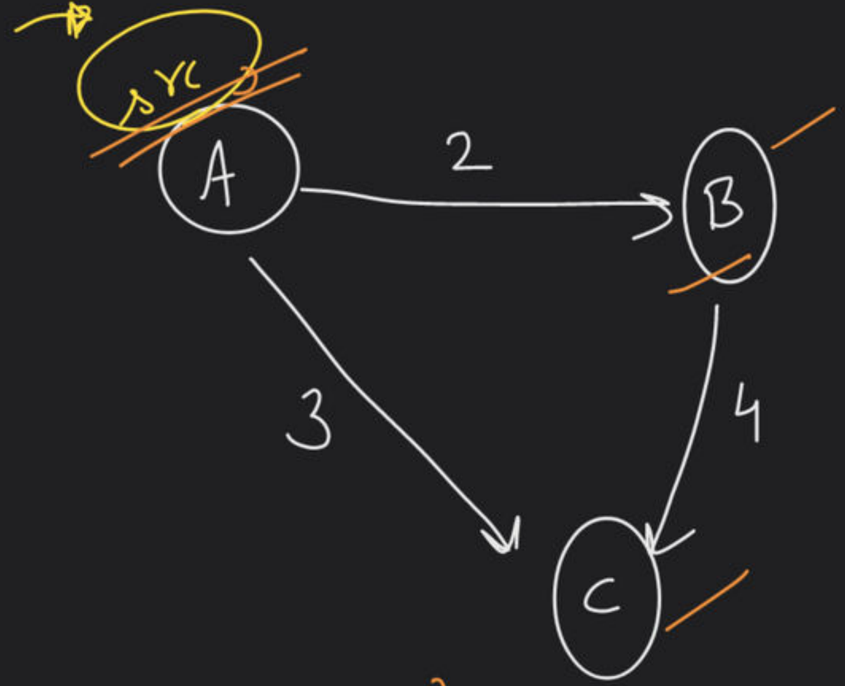
Graph Class - 7

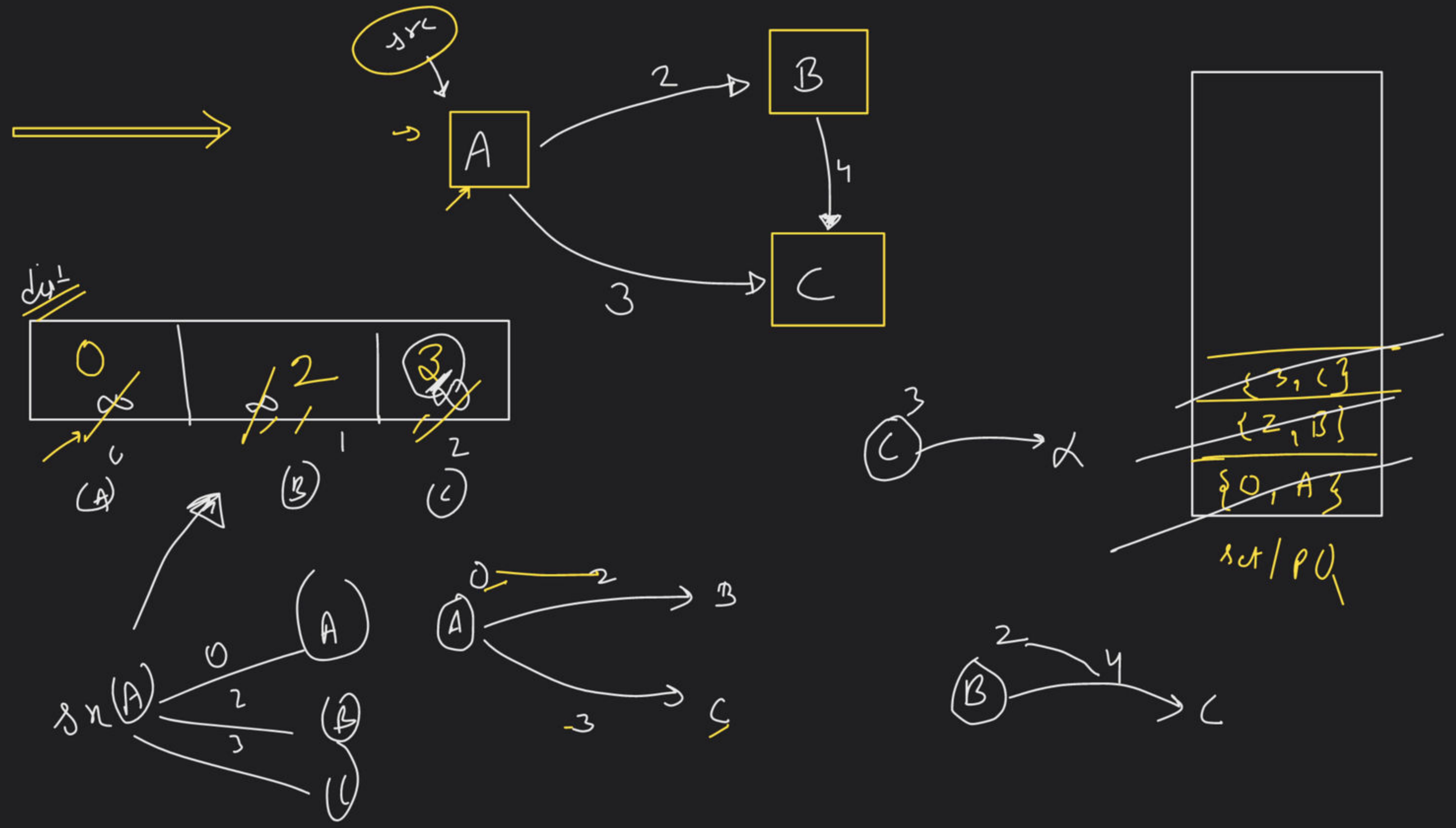
Special class

Love Babbar • July 1, 2023

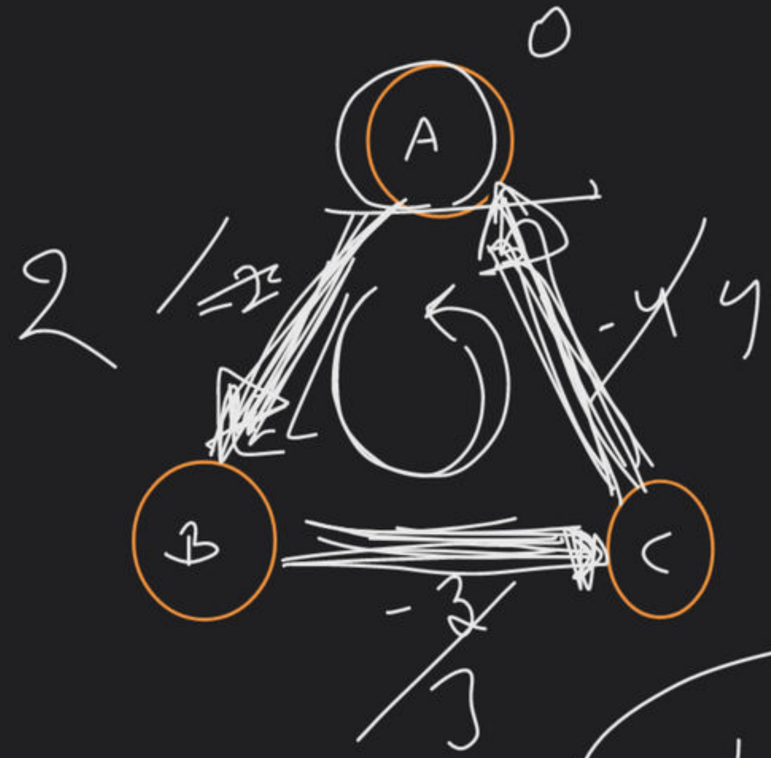
Dijkstra's Algo

A	B	C
0	∞	∞
	2	3





src
A
B
C
2
4
3
dist
0
2
3
set / PQ
{3, C}
{2, B}
{0, A}



0

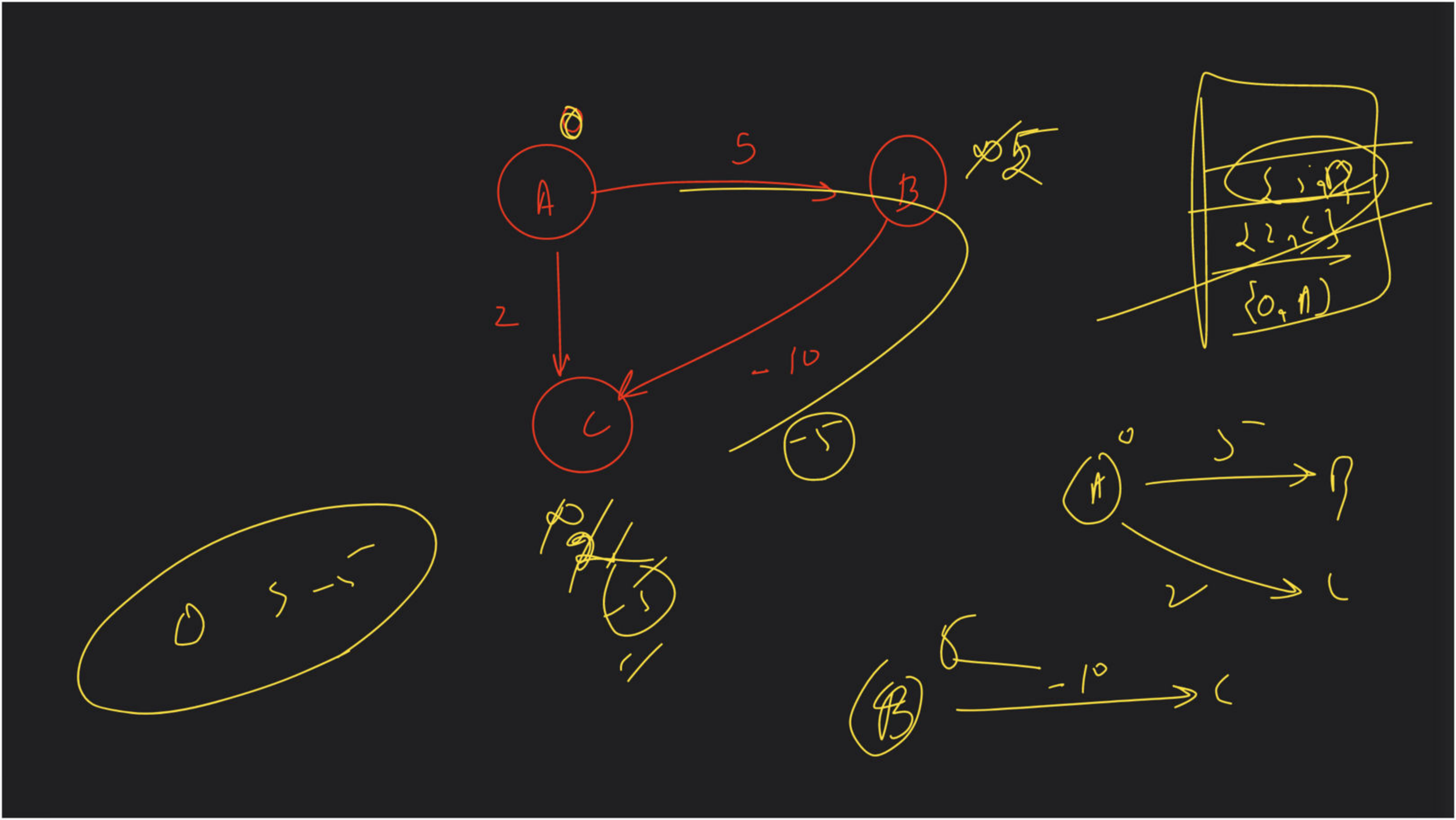
$-2 \quad -3 \quad -4 \quad = \quad -9$

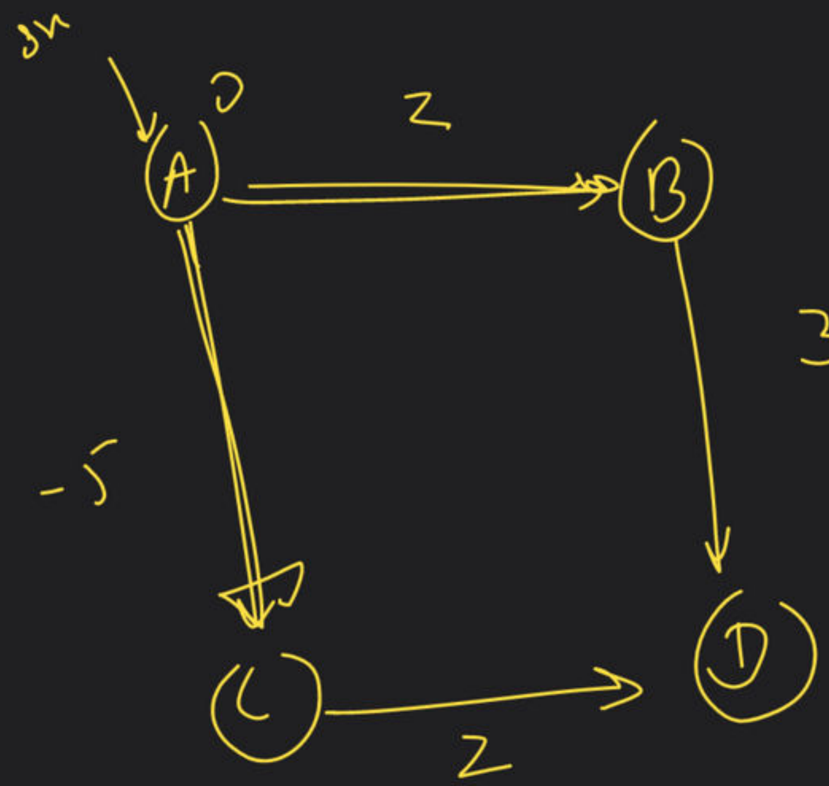
cycle → Path wt

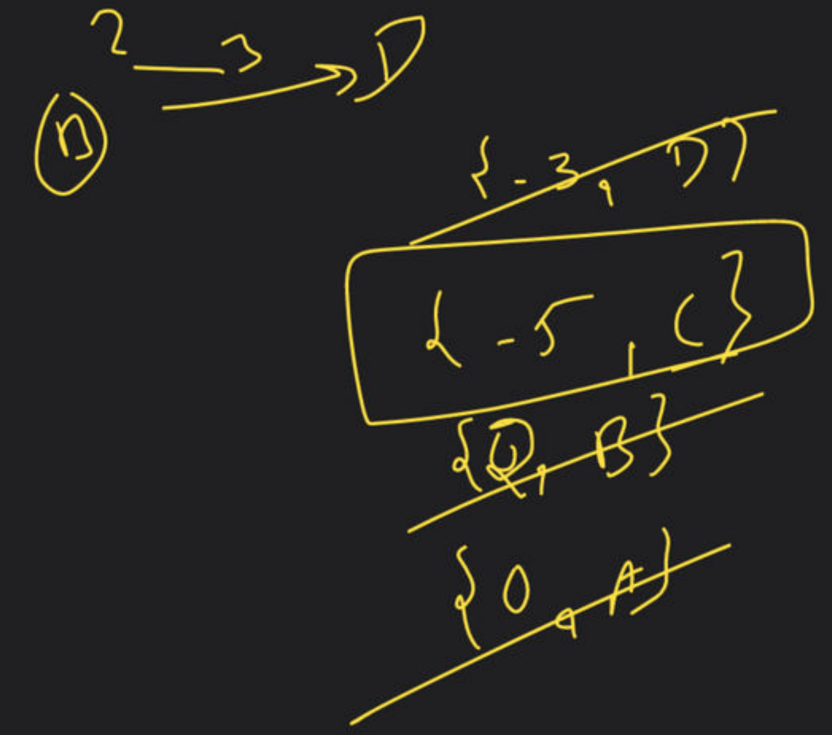
-ve cycle

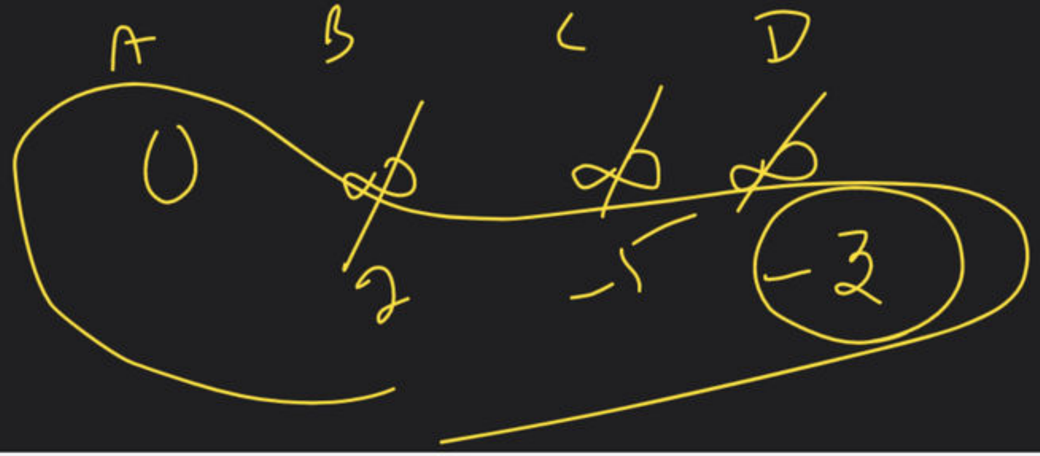
dijkstra's

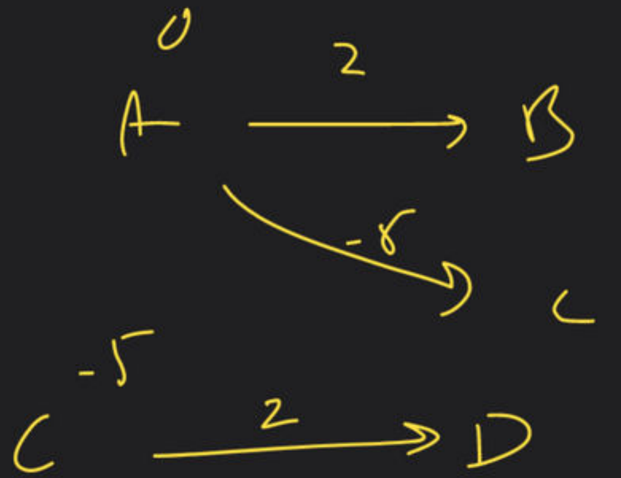
-ve cycles


A
B
C
5
2
-10
-5

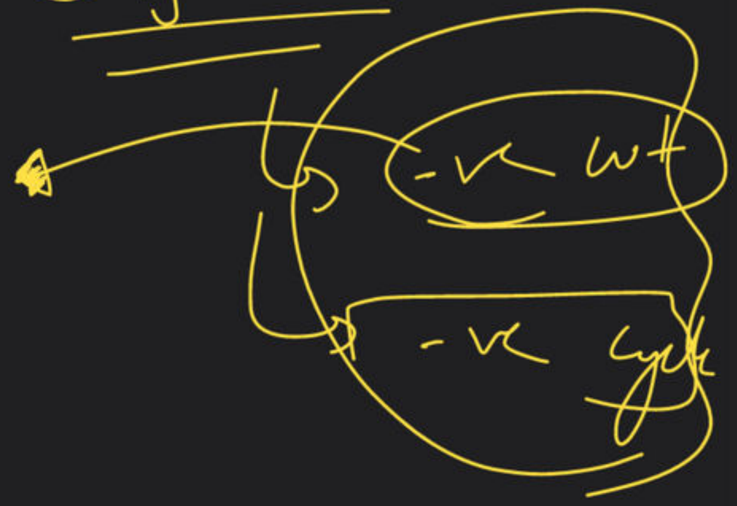

A
B
C
D
2
-5
3
2


2
3
D
{-3, D}
{-5, C}
{C, B}
{B, A}

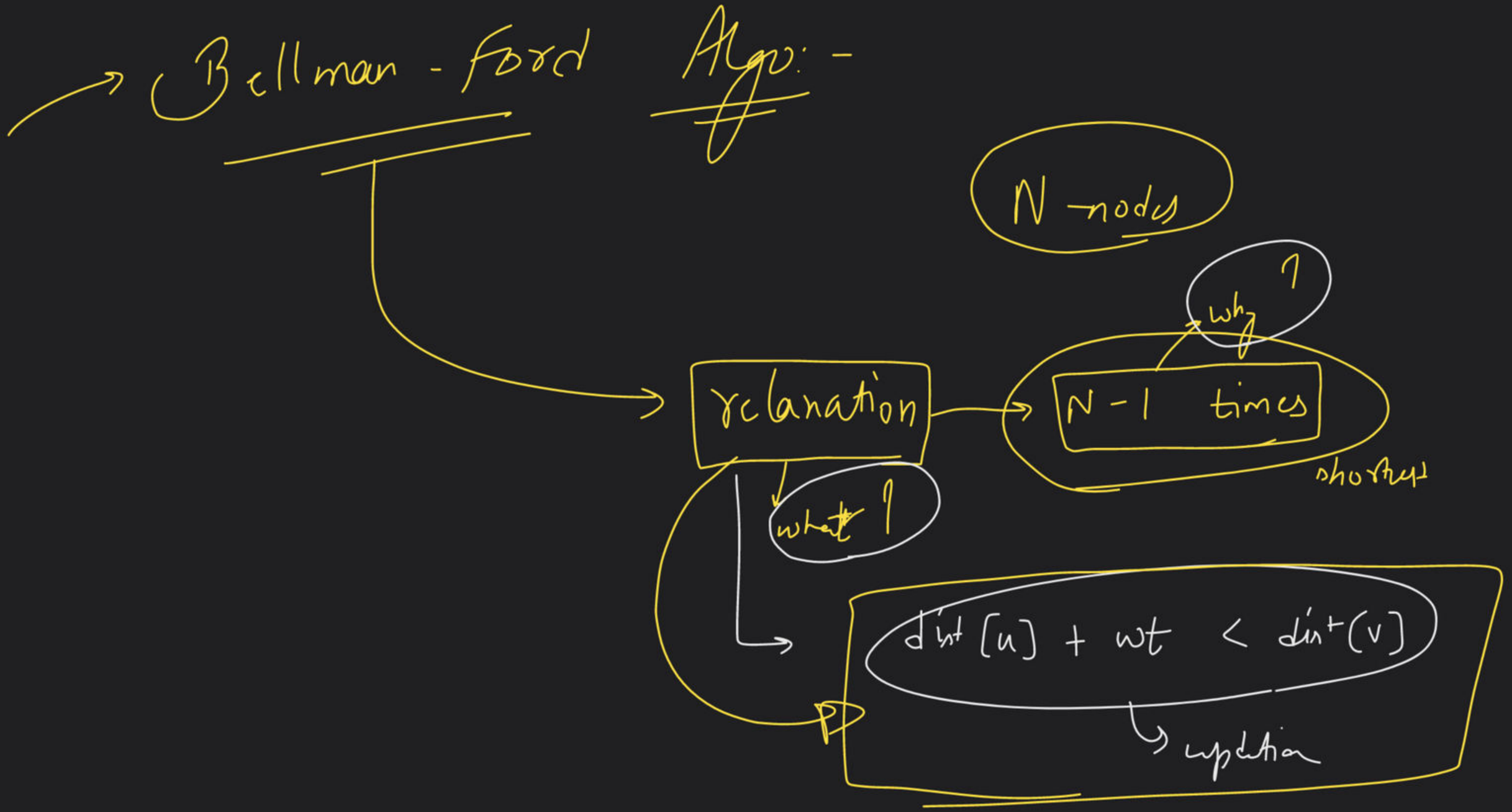

A
B
C
D
0
2
-5
-3

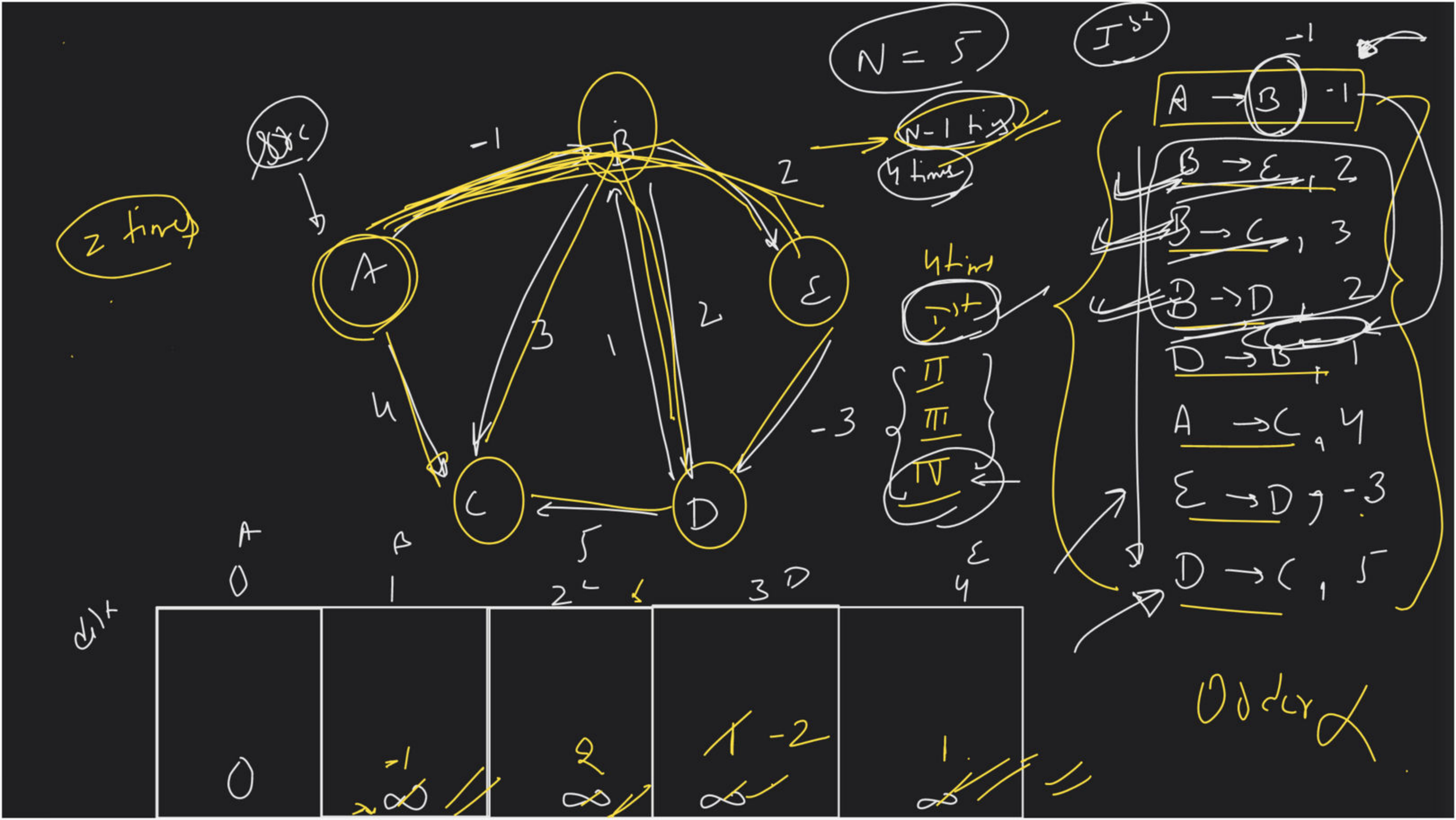

A
B
C
D
0
2
-5
-5
2

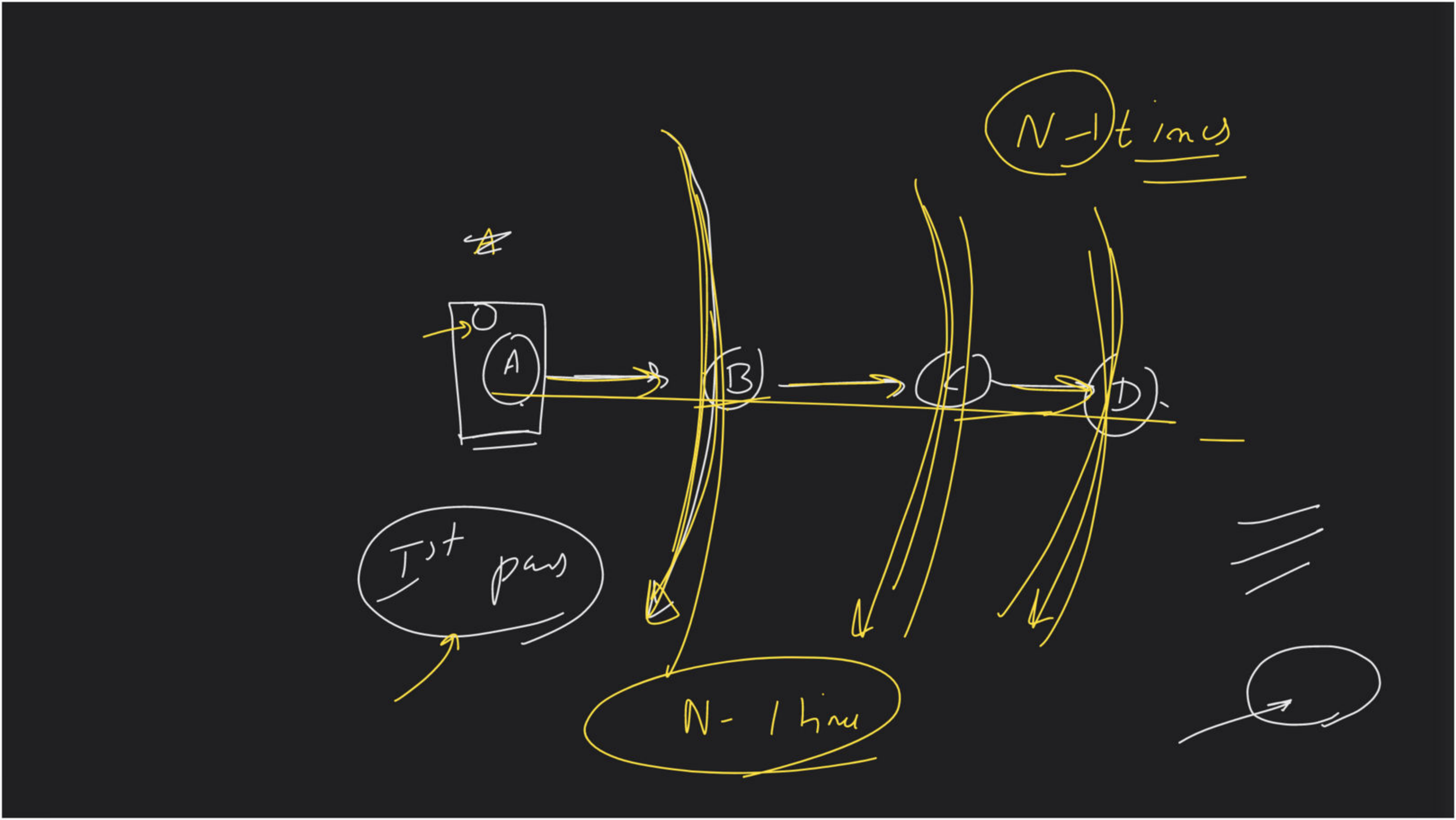
Dijkstra

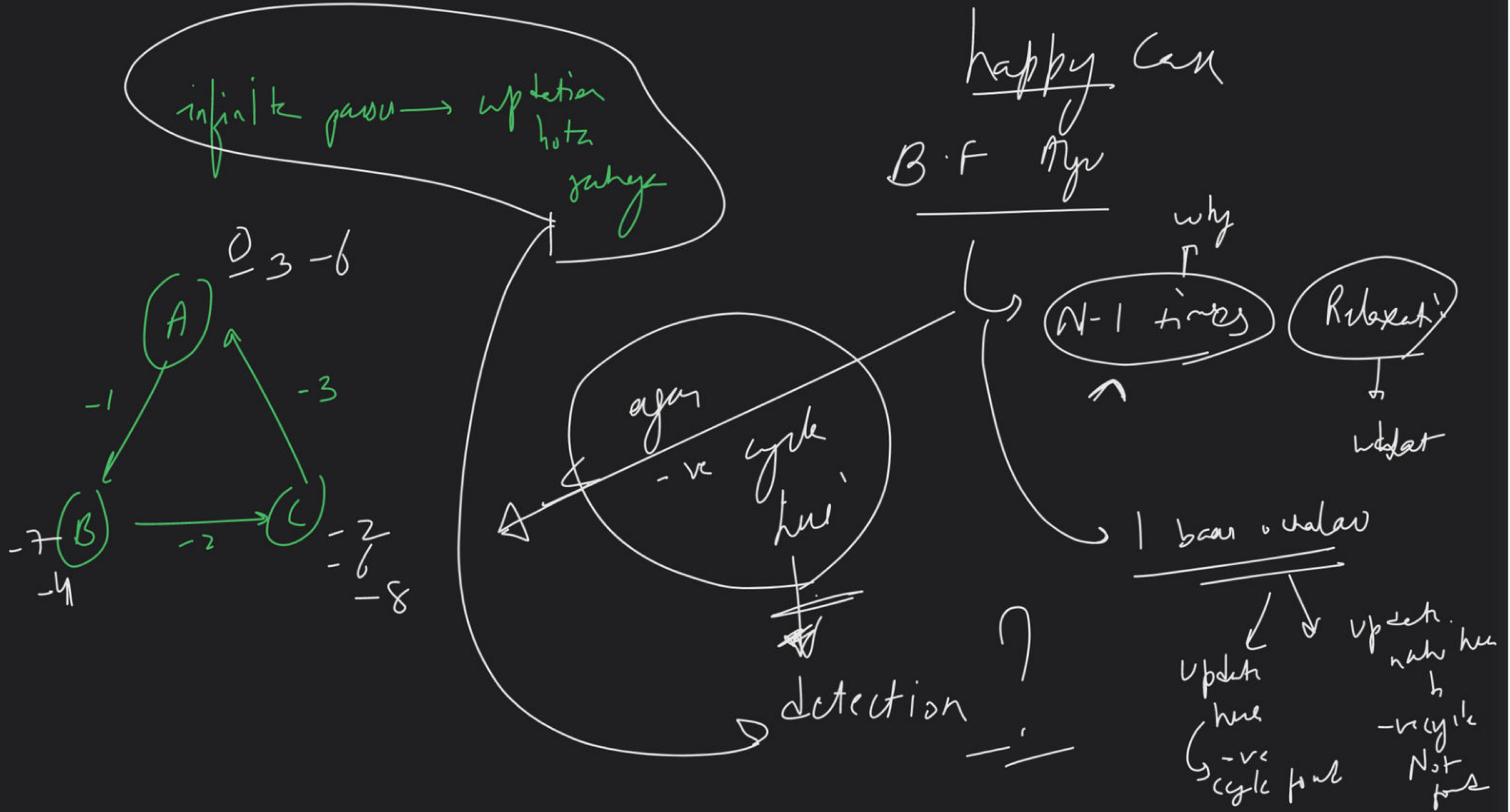


Bellman - Ford Algo: -




N = 5
N-1 times
4 times
2 times
A
B
C
D
E
-1
2
3
1
4
-3
5
4 times
A → B , -1
B → E , 2
B → C , 3
B → D , 2
D → B , 1
A → C , 4
E → D , -3
D → C , 5
Order
0
-1
2
1
-2
1


N-1 times
A
B
C
D
1st pass
N-1 times



infinite pass → updation hota jayega
0 3 -6
A
B
C
-1
-3
-2
-7
-4
-2
-6
-8
happy case
B.F Algo
why
N-1 times
Relaxation
update
again
-ve cycle
detection
1 baar chalao
update hue
-ve cycle found
update nahi hue
-ve cycle Not found

B.F Algo

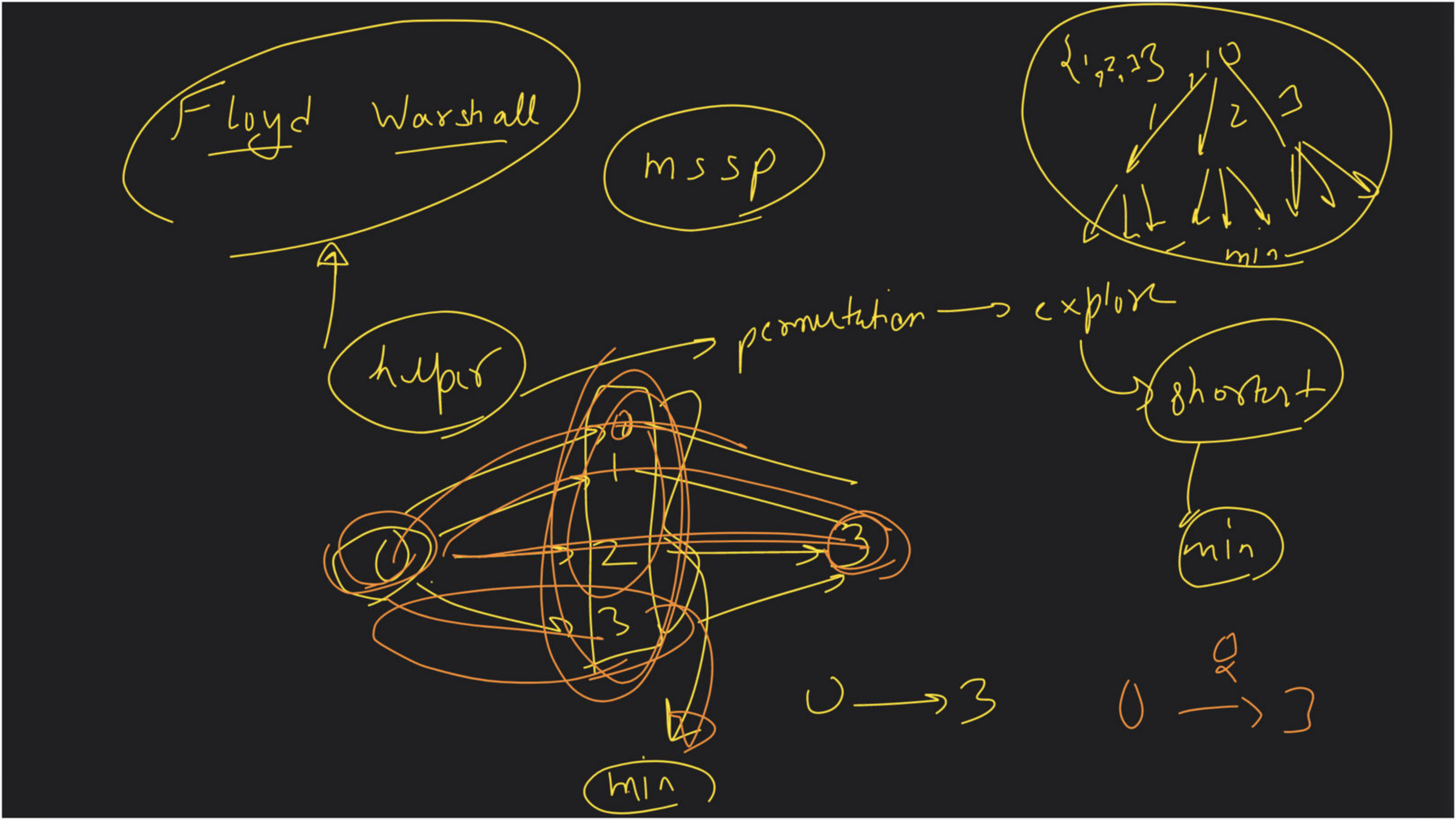
- ① (N-1) times relaxation on all edges
- ② to find / detect -ve cycle

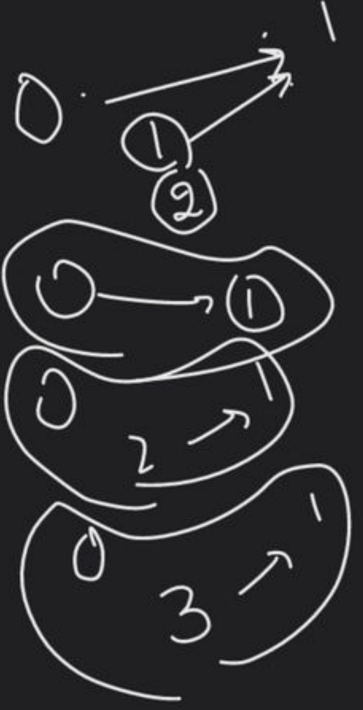
↓

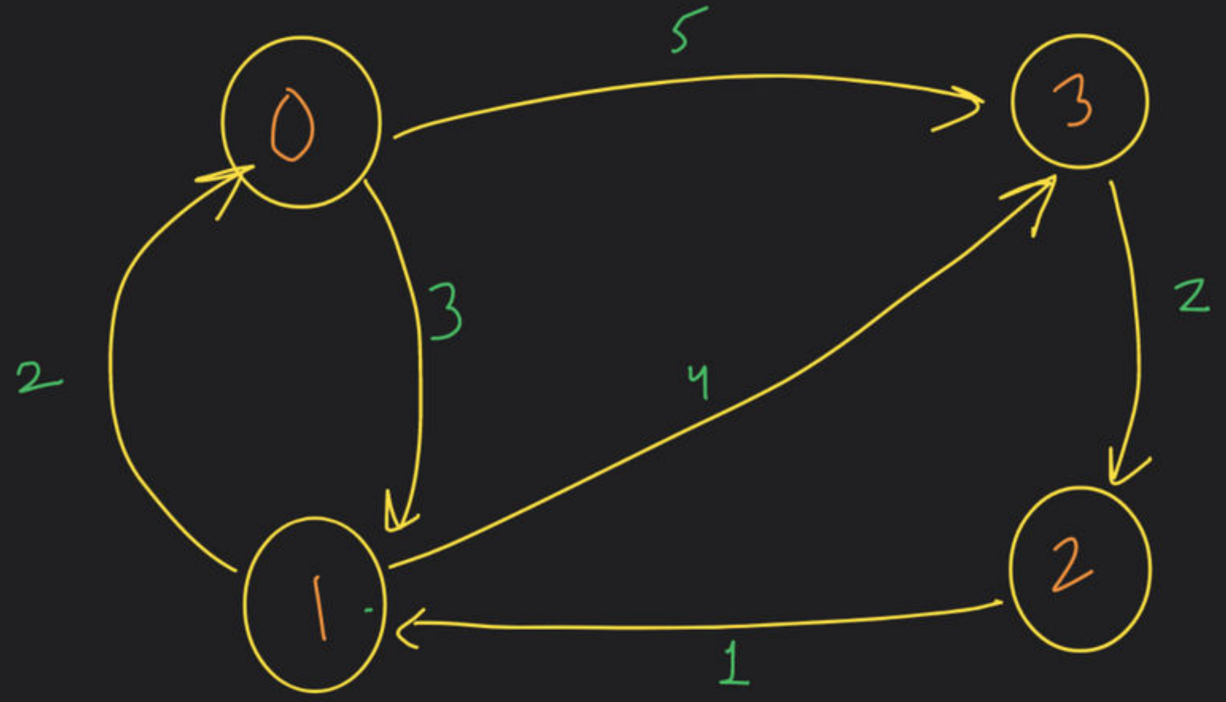
run relaxation step 1 more time

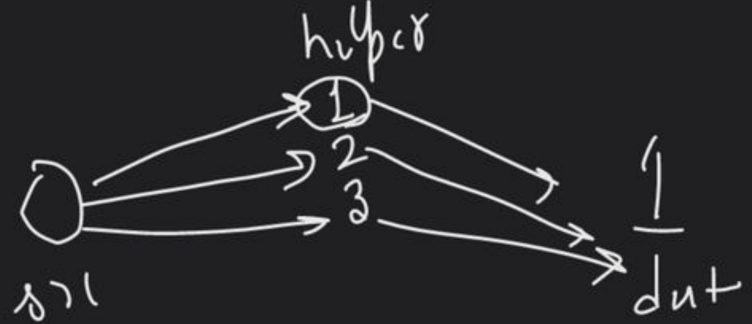
& if dist gets updated then, there is a -ve cycle.

floyd warshell

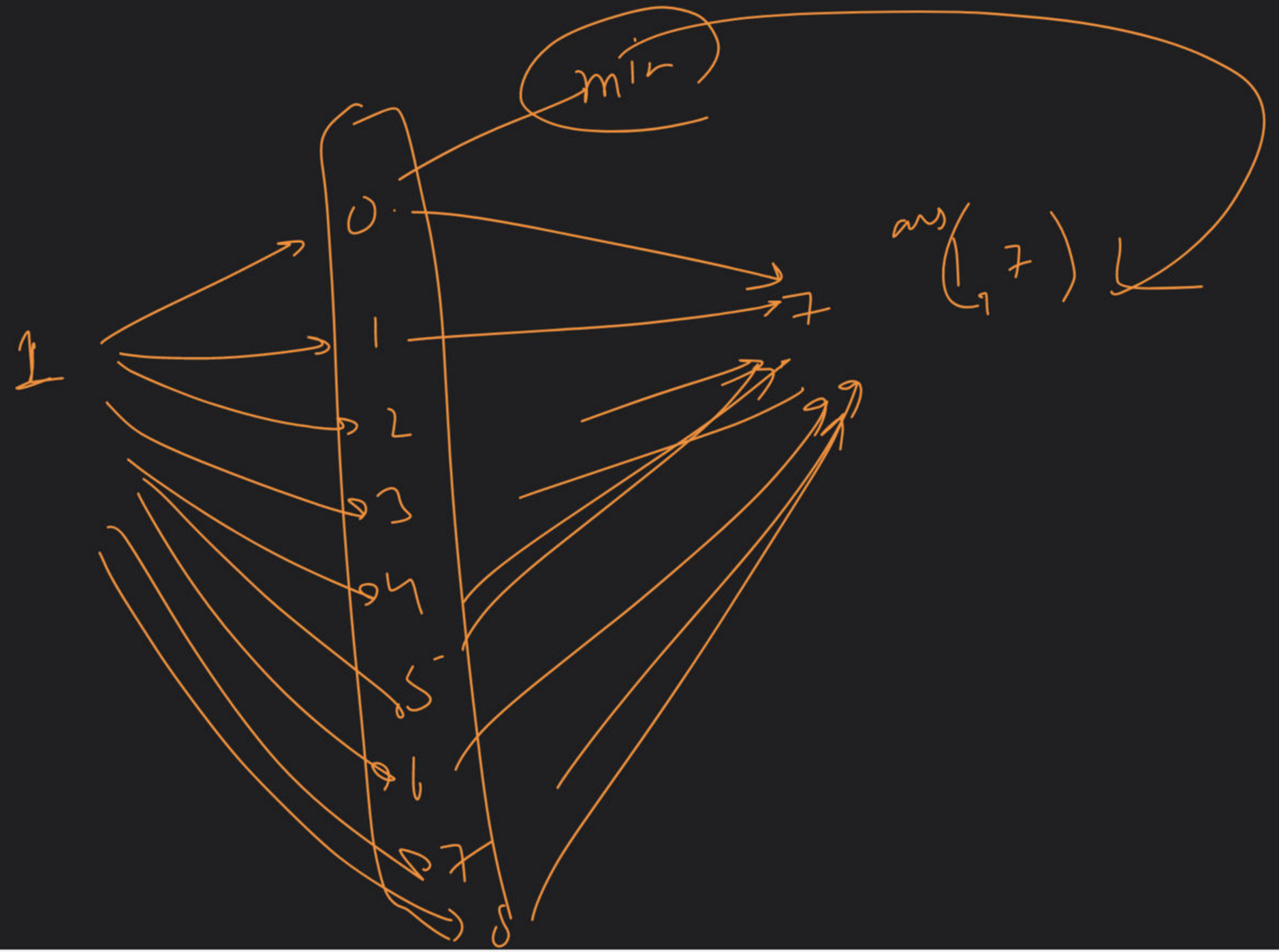

Floyd Warshall
mssp
{1,2,3}
1
2
3
min
helper
permutation
explore
shortest
min
0
1
2
3
min
0 → 3
0 → 3







	0	1	2	3
0	0	∞	∞	∞
1	∞	0	∞	∞
2	∞	∞	0	∞
3	∞	∞	∞	0


min
0
1
2
3
4
5
6
7
8
1
7
ans (1, 7)

for (helper

{ for (i ⟶

for (j ⟶

{

dist[i][j] = min(dist[i][j],

dist[i][helper] + dist[helper][j])

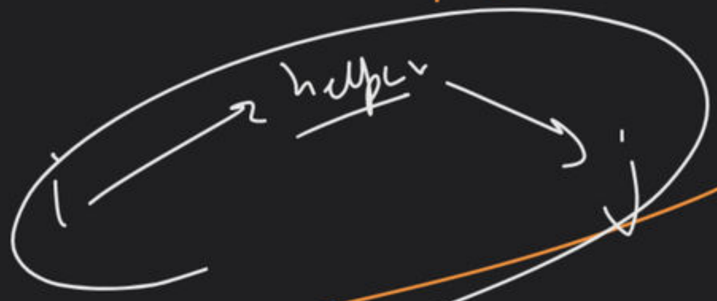
}

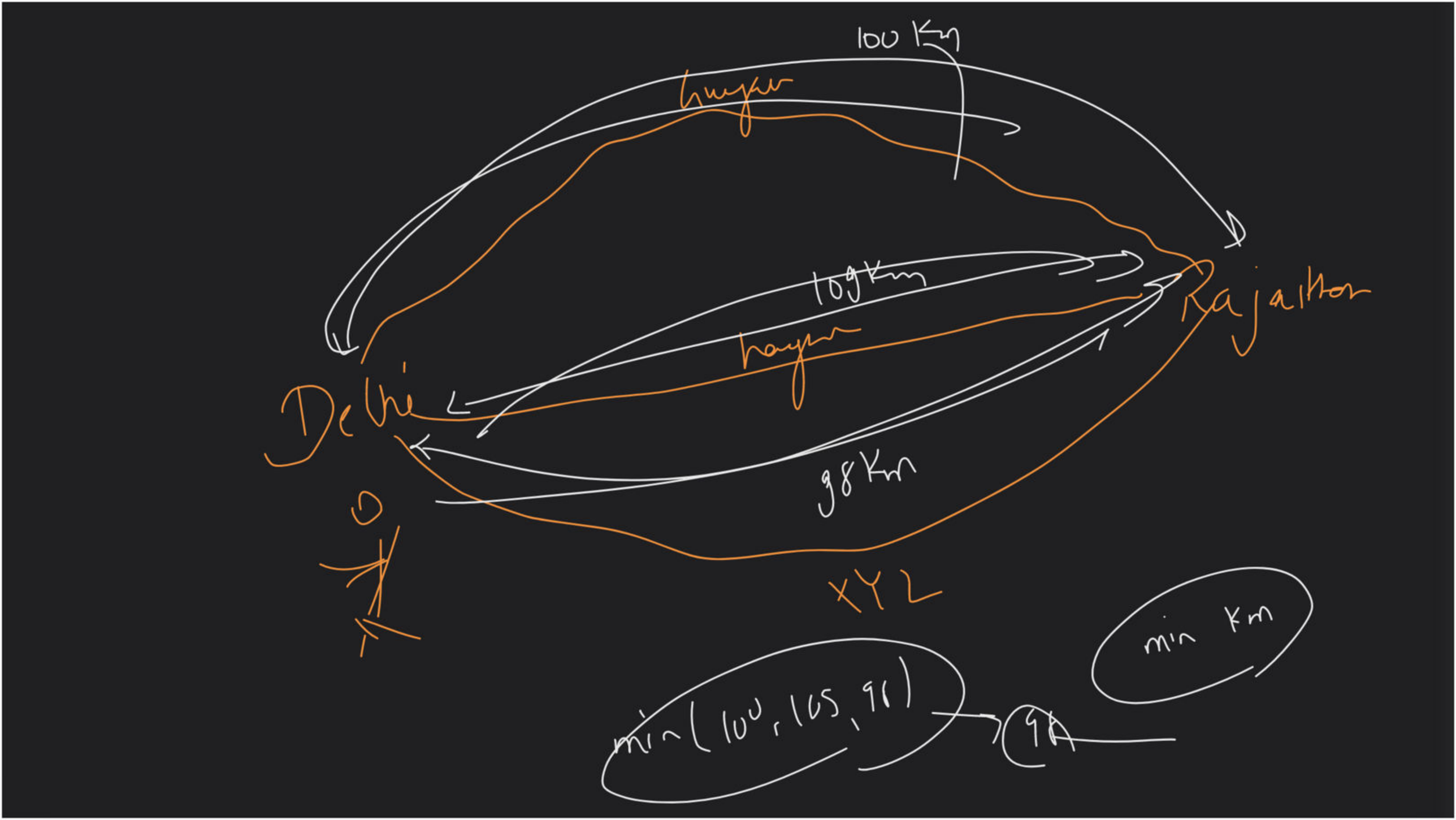
}

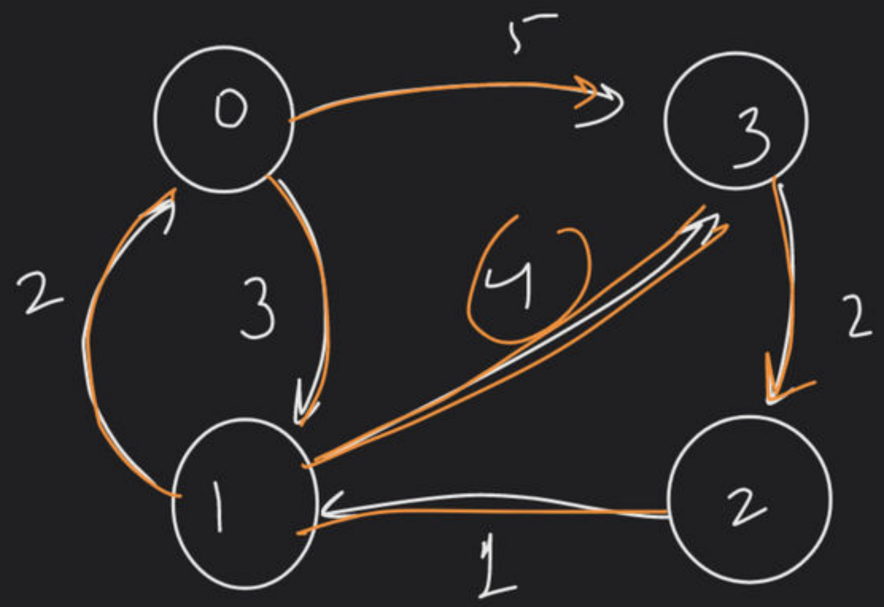
}

src — i

dest — j




100 Km
Jaipur
109 Km
Jaipur
Rajasthan
Delhi
98 Km
XYZ
min Km
min(100, 105, 91)
91



0	3	∞	5
2		∞	4
	1	0	∞
∞	∞		0