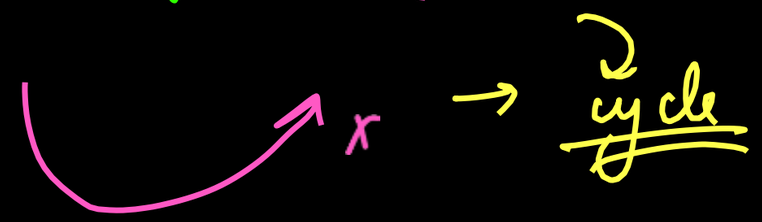
Graphs 07
Graphs (Part 4)

Topological Sorting → DAGs

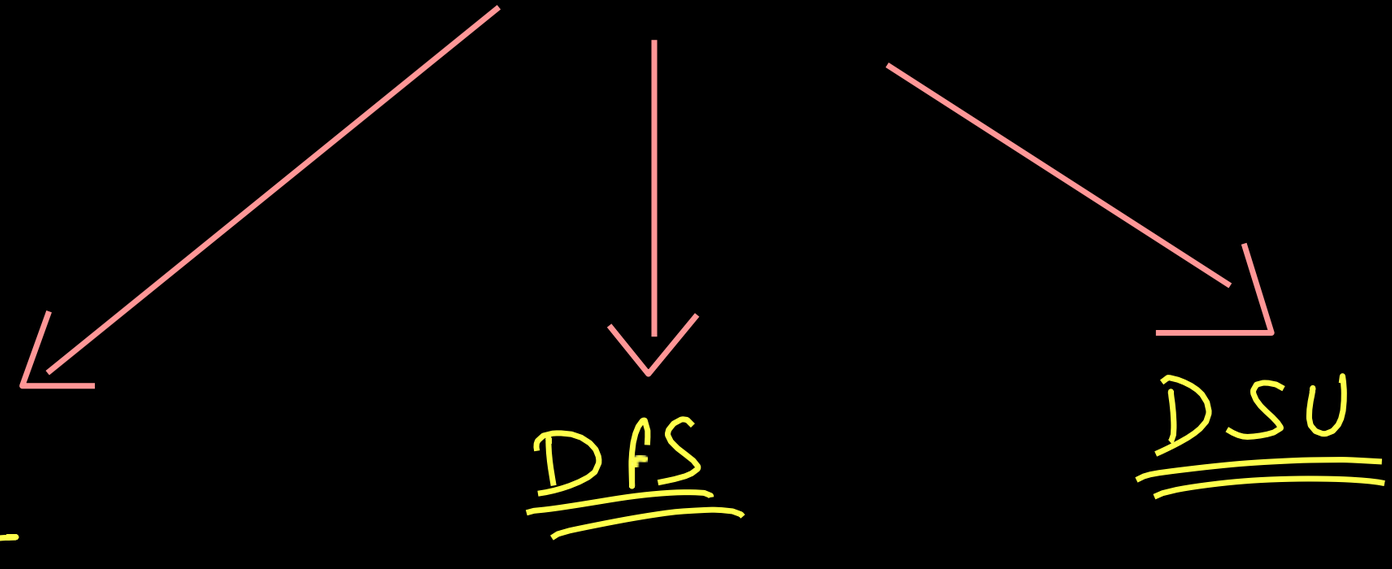


Q: Given a directed graph, detect if it is having cycles or not??

↳ Kahn's algo

JOIN THE DARKSIDE

Q. How to detect cycle in an undirected graph ??



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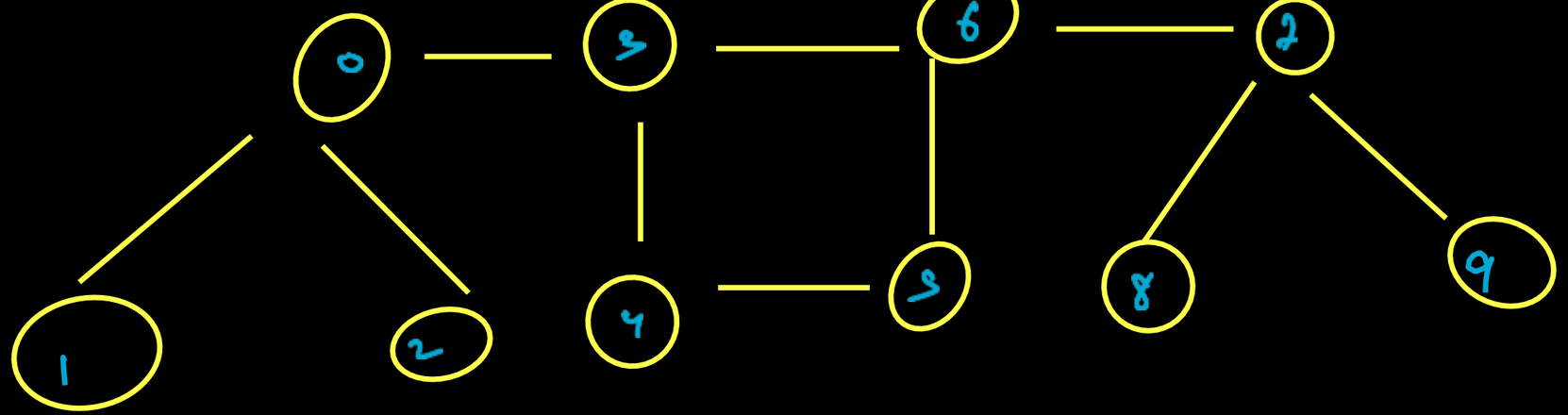
Cycle detection using DSU

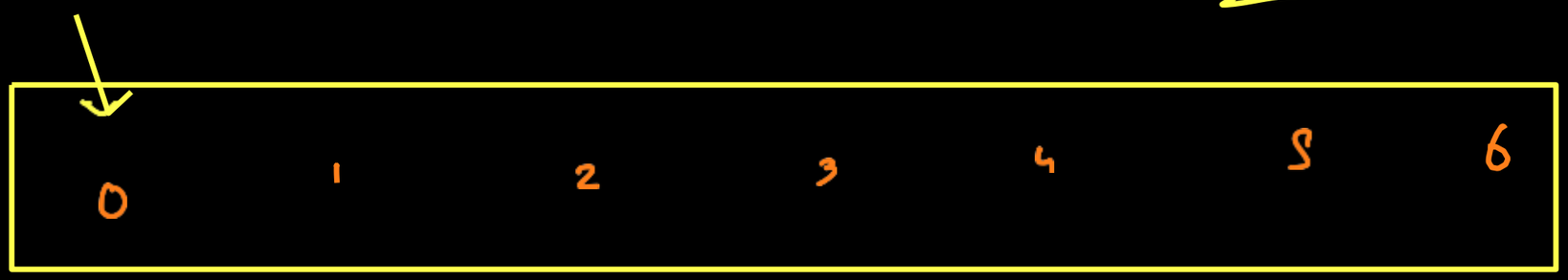


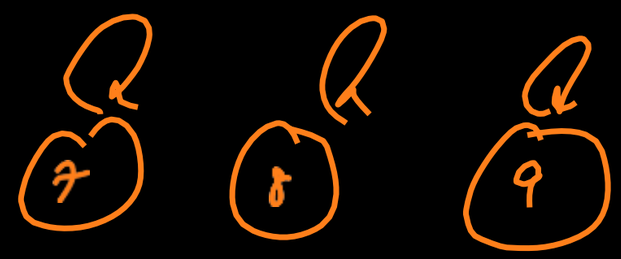
Edge list

```
[ [0,1],
  [0,2],
  [0,3],
  [3,4],
]
```

↳ let's create a dsu

X





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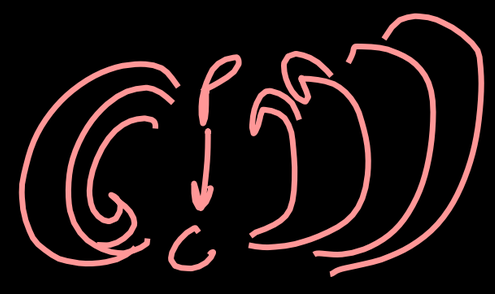
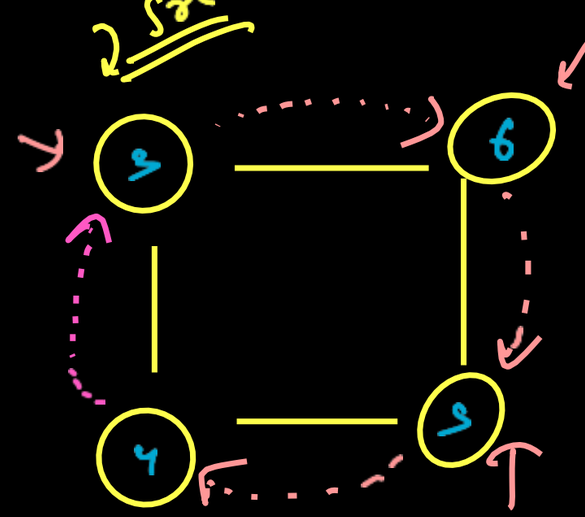
we will read each edge & on the vertices of the edge apply union operation.

Cycle detection using DFS



check if the visited is not your parent then there is a cycle.



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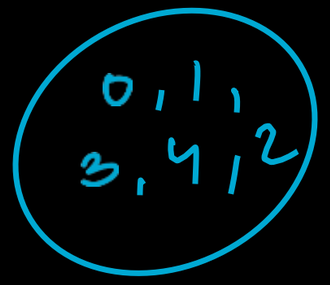
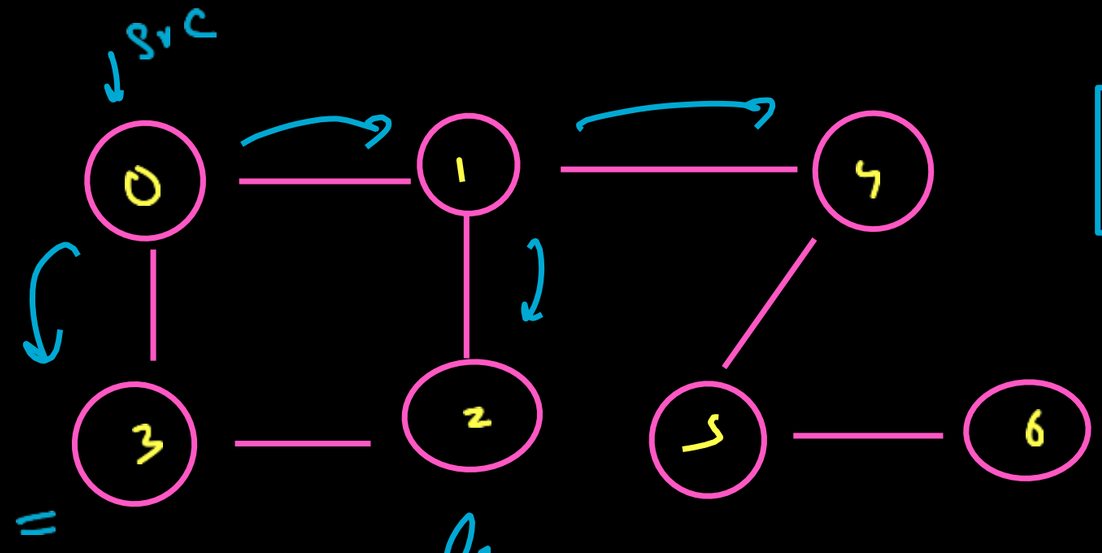
cycle detection using BFS





= cycle

parent

0	1	2	3	4	5	6
-1	0	1	0	1		

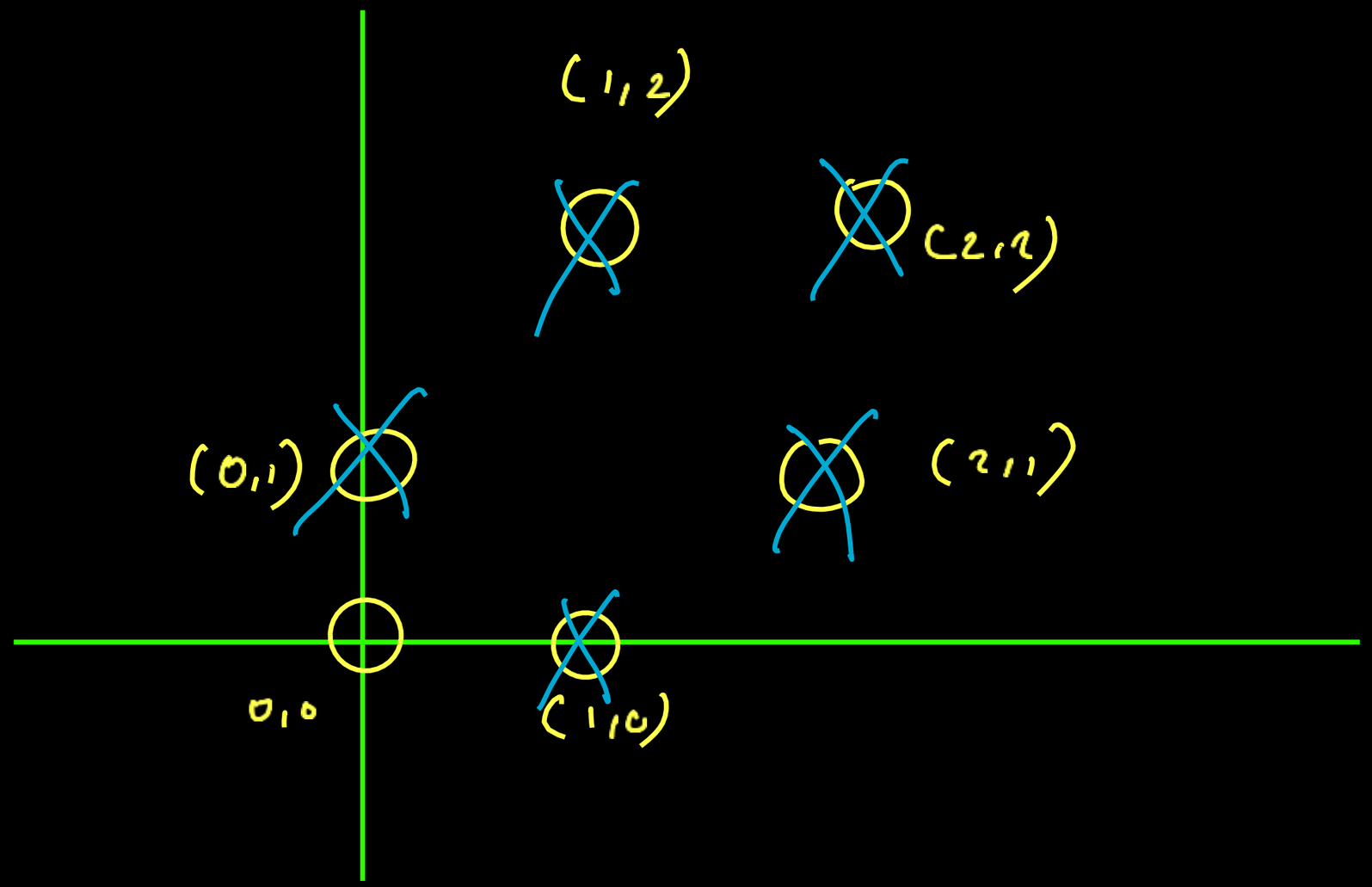
	1	4	2

↳ queue

if a node is already visited & it is not your parent then you have a cycle.

JOIN THE DARKSIDE

leetcode 947



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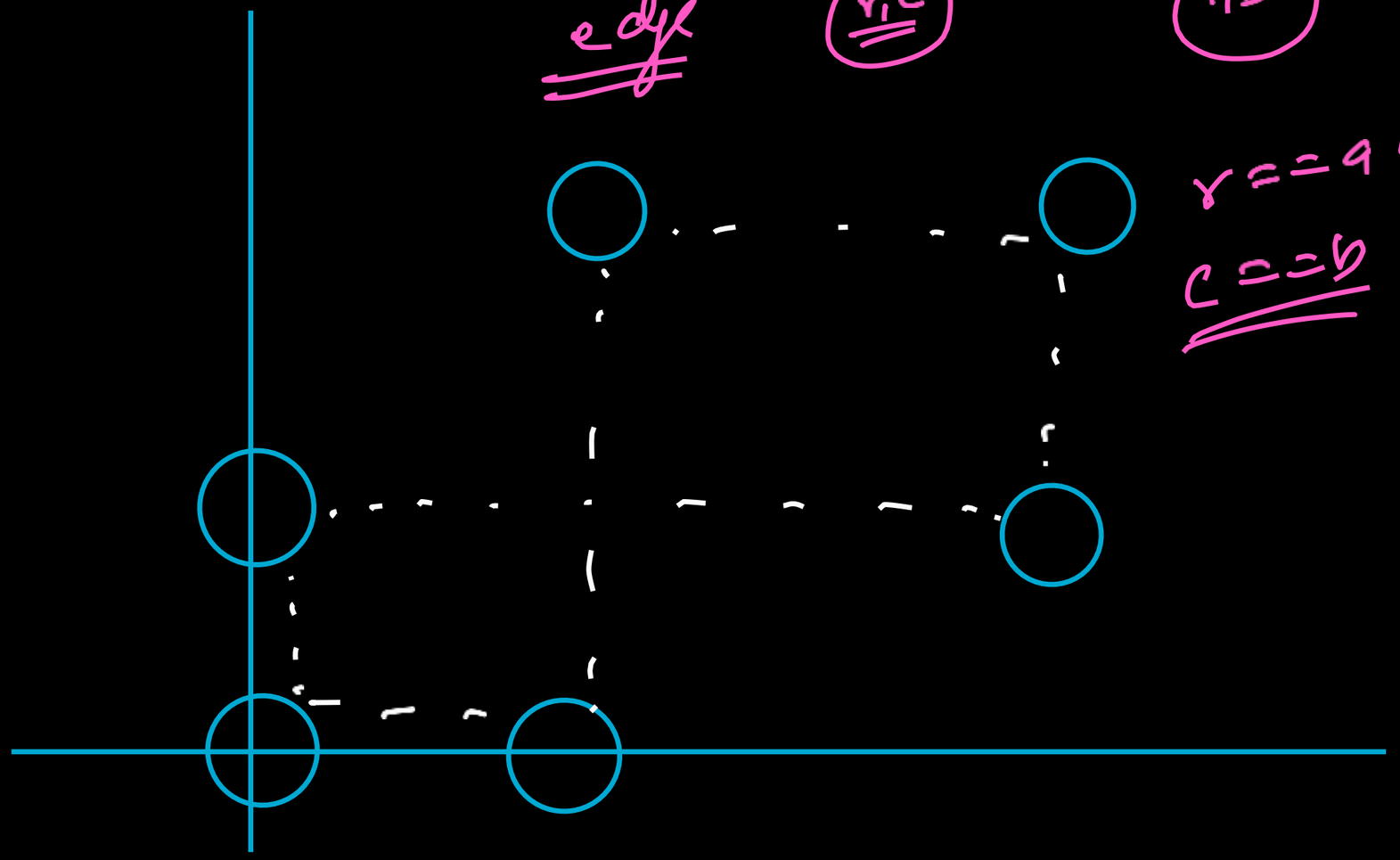


edge (r, c) (q, b)

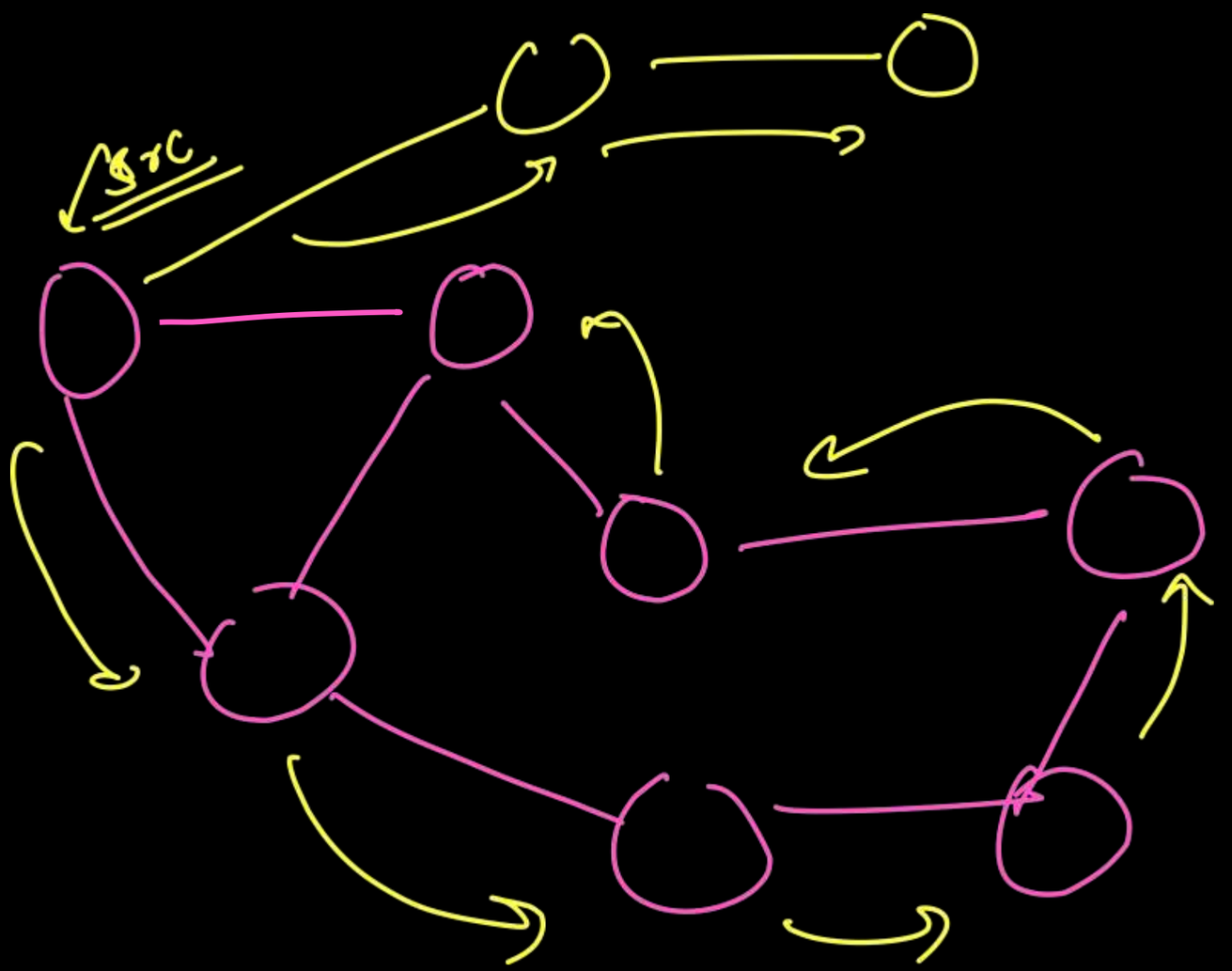
r == q or c == b

if 2 nodes share their row then they are in same component

or if 2 nodes share their col then they are in a same component

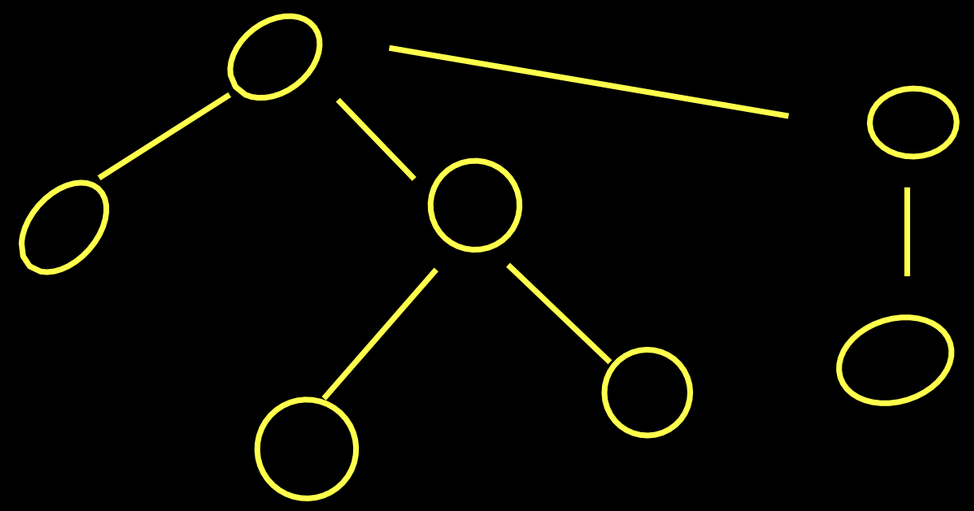
↳ Total nodes — no. of CC

JOIN THE DARKSIDE



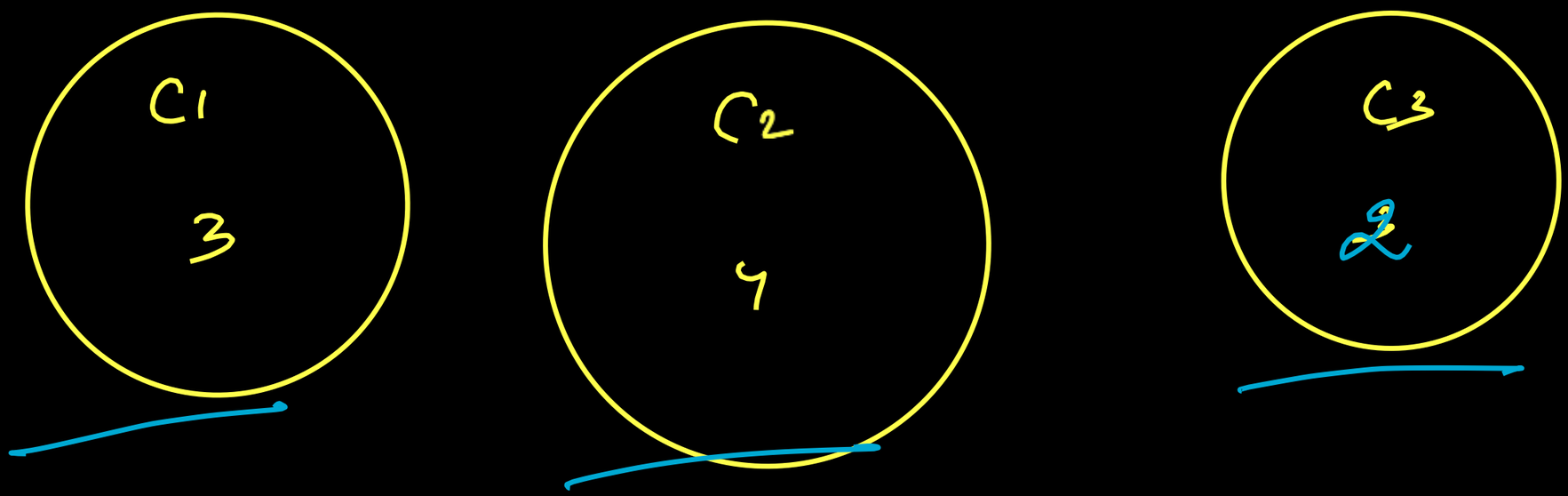
DFS req.

JOIN THE DARKSIDE



JOIN THE DARKSIDE

↳ Disconnected graph ⇒ edge list (DSU) ← SL of CC



3 x 4 + 4 x 2 + 3 x 2

CC1 CC2 CC3 ..... 10^5

n

n^2

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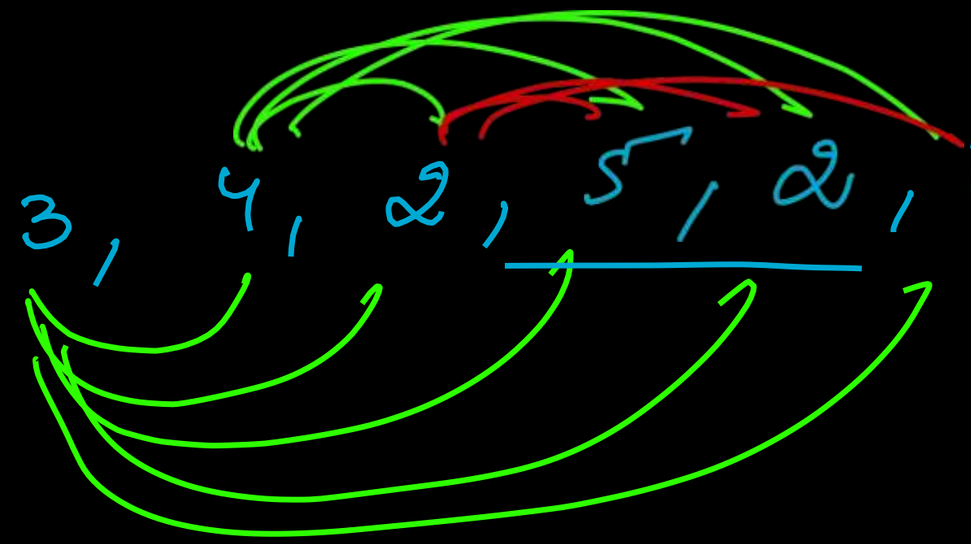
dp



suffix sum

$3 \times 4 + 3 \times 2 + 3 \times 5 + 3 \times 2 + 3 + 1$

$+ \quad 4 \times 2 + 4 \times 5 + 4 \times 2 + 4 \times 1$

$+ \quad 2 \times 5 + 2 \times 2 + 2 \times 1$

$+ \quad 5 \times 2 + 5 \times 1$

$+ \quad 2 + 1$

$3 \times (4+2+5+2+1)$

$4 (2+5+2+1)$

pairs

JOIN THE DARKSIDE

↳ $S_2 \times (\gamma m - S_2)$

JOIN THE DARKSIDE

PW SKILLS

THANK YOU