



# Graphs 05

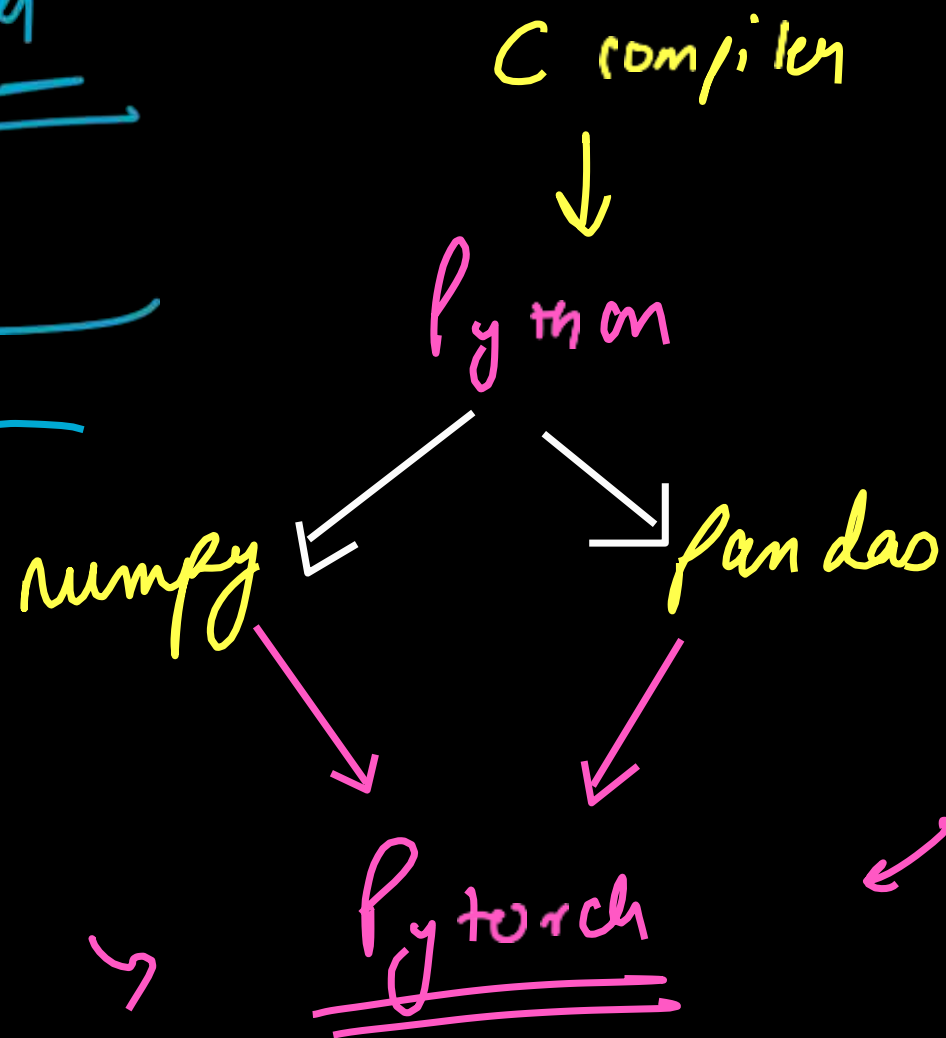
## Graphs (Part 2)



Topological sort ← Dependency Resolution

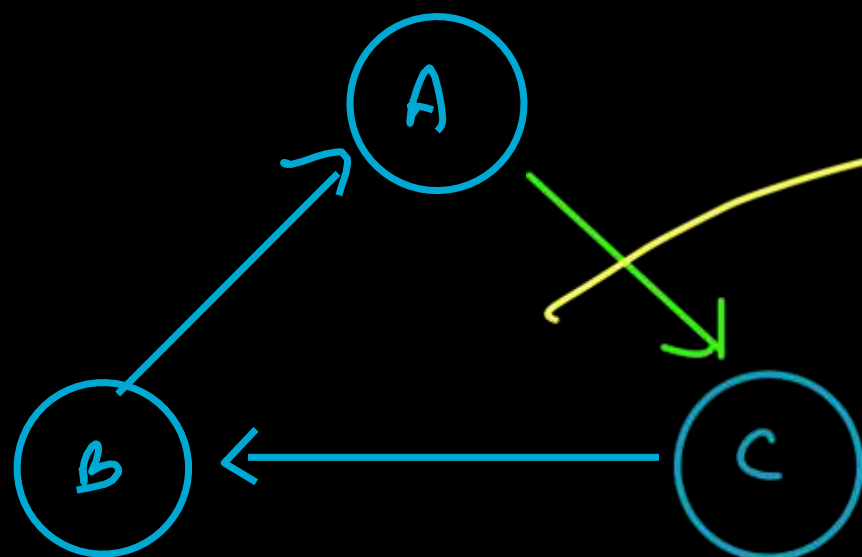
Directed graph

Ayclic



dependency graph

DAG



cyclic graph

→ cannot be resolved  
for dependency

3 n inequalities

2

Can these inequalities

be solved?

$$a < b$$

$$b > d$$

$$e > f$$

$$a < d$$

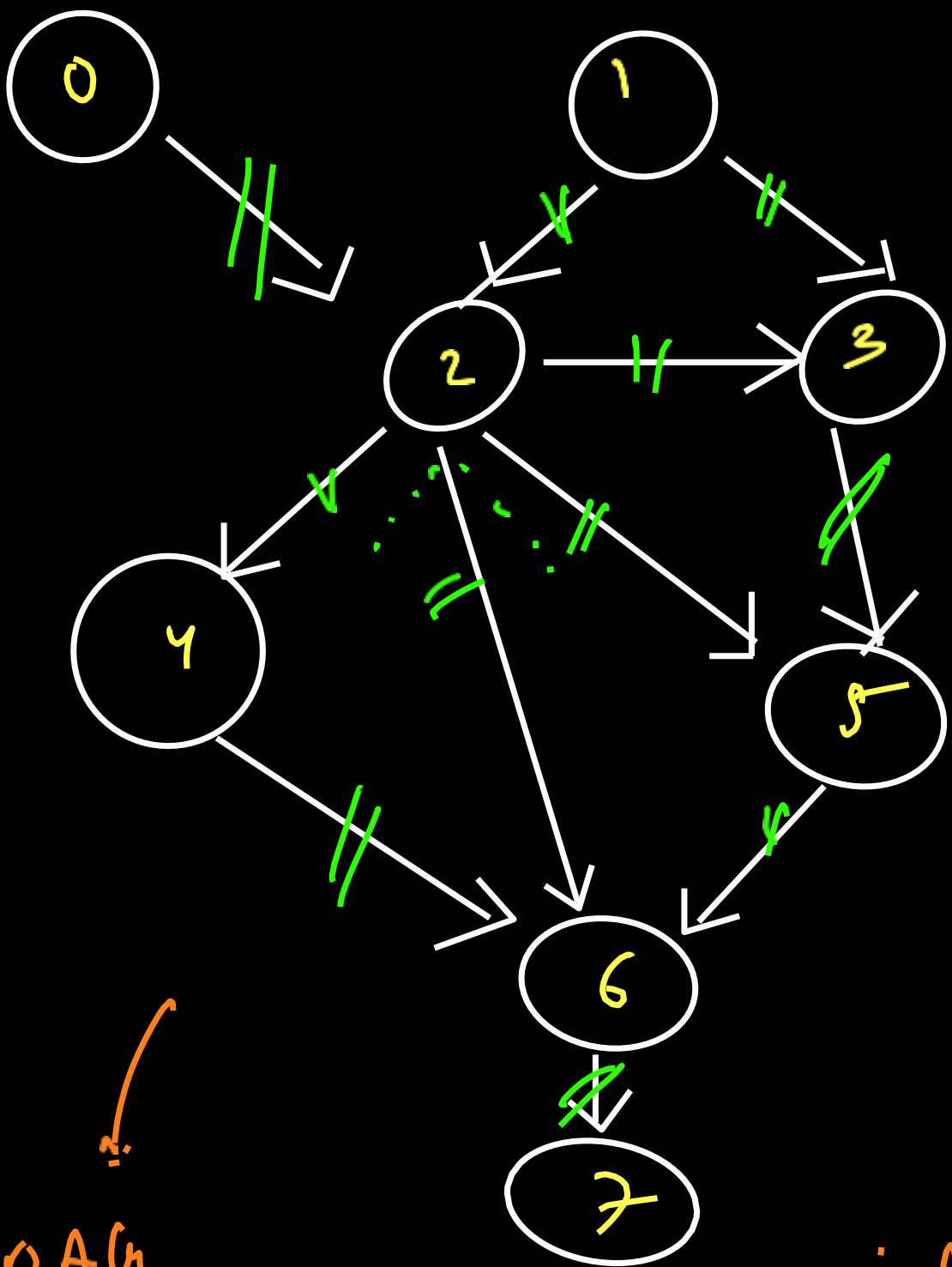
$$c > f$$

$$e > a$$

$$\underline{a \leftarrow b}$$

$$\underline{b \rightarrow d}$$

DAG ??



DAG

Kahn's algo → in degree

↓  
in degree of a node is  
defined as how many incoming  
edges you have.

0 1 2 3 4 5 6 7 → queue



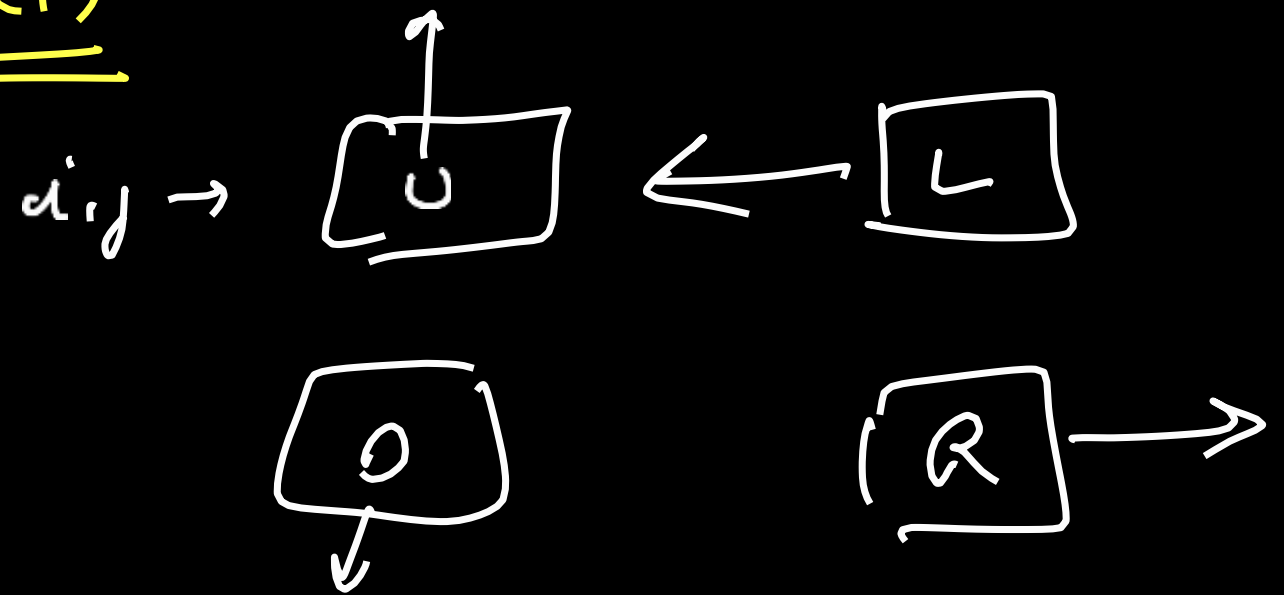
indegree →

0	1	2	3	4	5	6	7
0	0	0	0	0	0	0	10

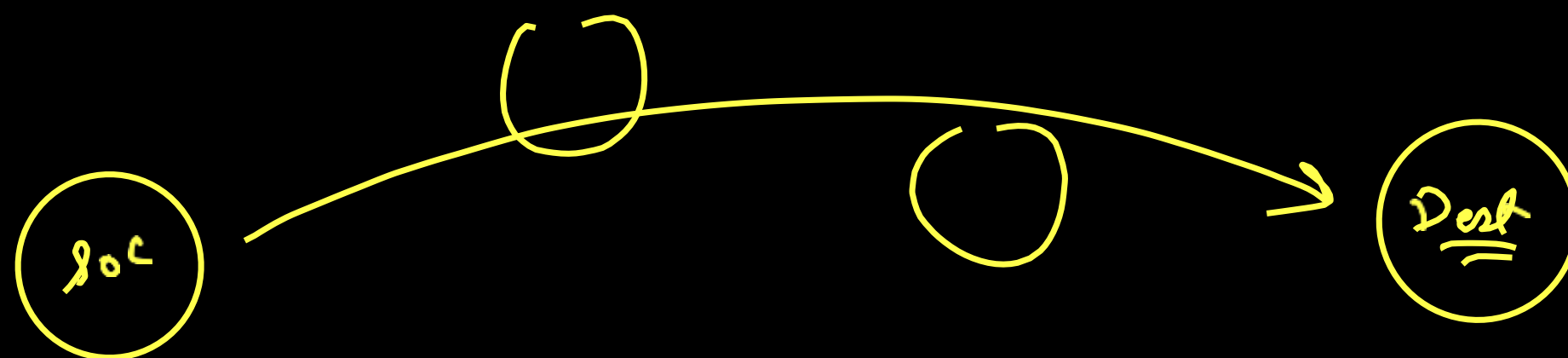
Q<sub>2</sub> Given a grid of  $n \times m$  size. Every cell of the grid, are marked as 'L', 'R', 'U', 'D'. Character on a cell denotes if you are standing at that cell, what direction you can move to. Check if we start from  $(0,0)$ , can we reach  $(n-1, m-1)$  ?  $\rightarrow$  Space  $\rightarrow$   $O(1)$

R	R	D	R
D	L	D	L
U	D	L	D
U	R	R	R

non modify



$f(i, d) \rightarrow f(i, d+1)$   
 $\downarrow$   
 $f(i+1, d)$



dfs / bfs  
X

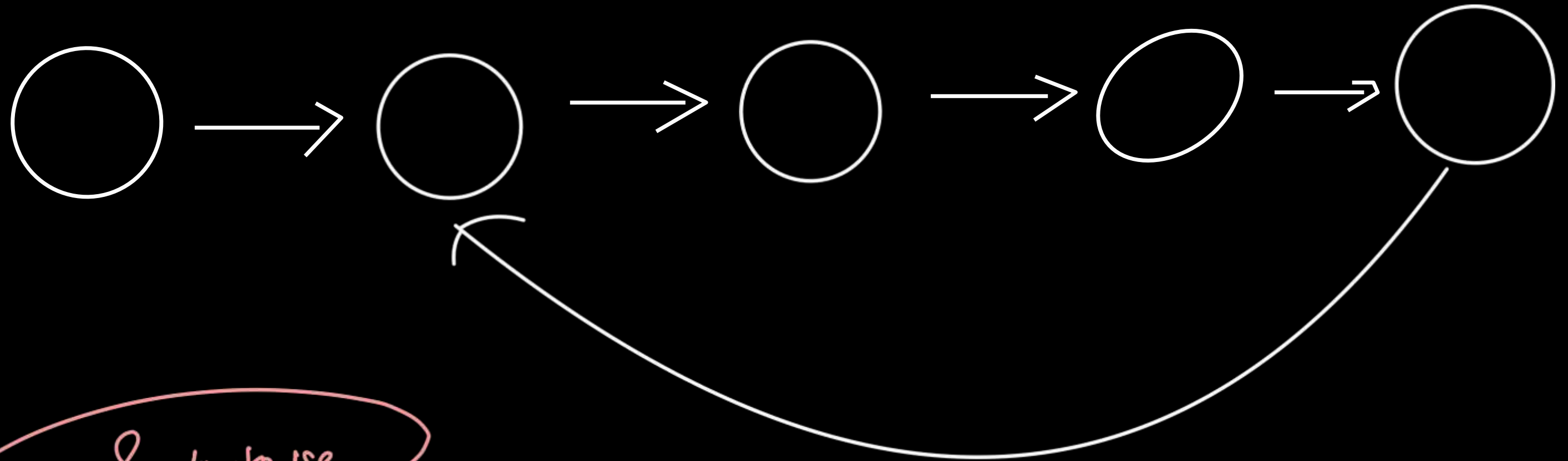
when (sky  $\leq$  n+m)

R	R	R	D	
		U	O	
		U	L	

total  $\rightarrow$  n x m steps

there won't be any  
cycle if it is  
possible to reach  
dest.

we will get a  
cycle if we visit  
a cell twice



Have & to know

fast, slow

$x \rightarrow x+1$   
 $x \rightarrow x+1$





► **THANK YOU** ◀