


Topological Sort

what

DAG → why ?

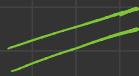


→ DAG: - Directed Acyclic graph
no cycle

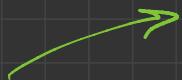
Kahn's algo

↓
BFS

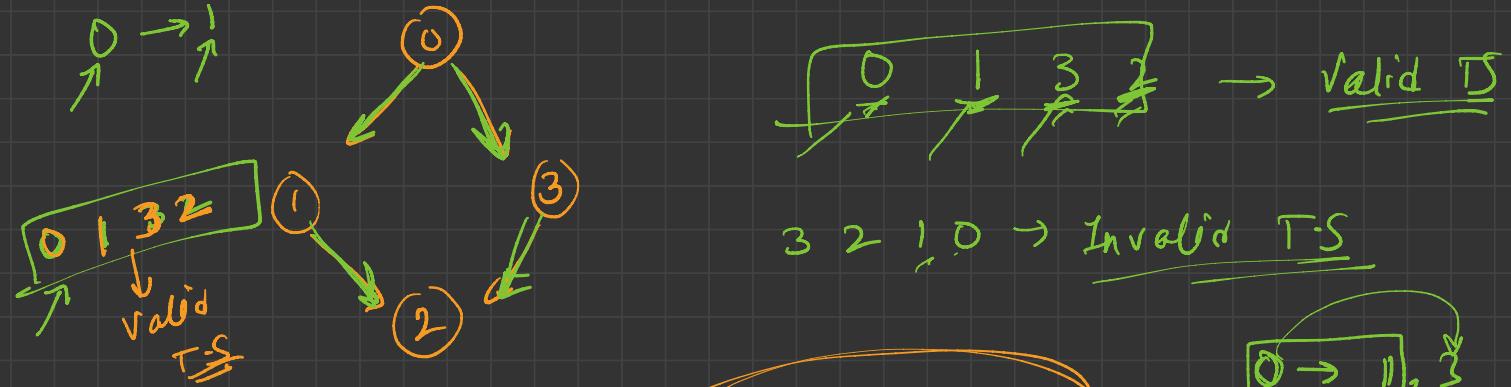
→ what ? → Linear ordering of vertices such that



for every edge $u \rightarrow v$



u always appears before v in that ordering



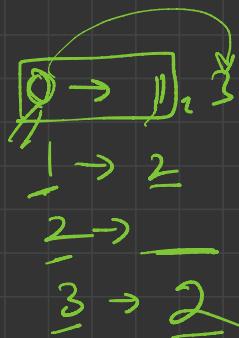
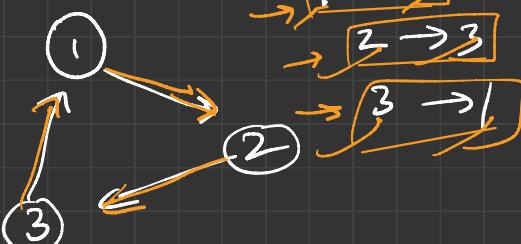
$0 \rightarrow 1$
 $1 \rightarrow 2$
 $2 \rightarrow 3$
 $0 \rightarrow 3$

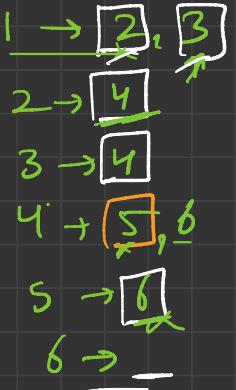
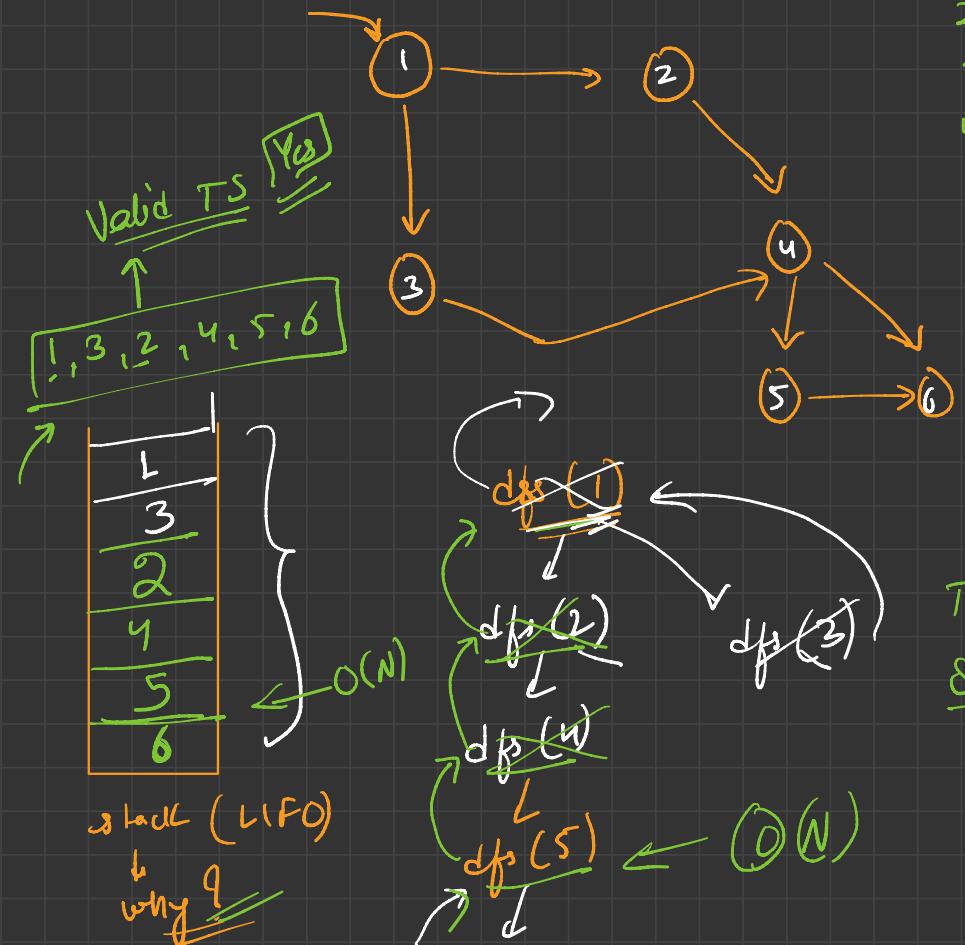
$0 1 2 3$

Invalid
T.S.



$1 \rightarrow 2 \rightarrow 3 \rightarrow 1$ → ? [Valid T.S.]





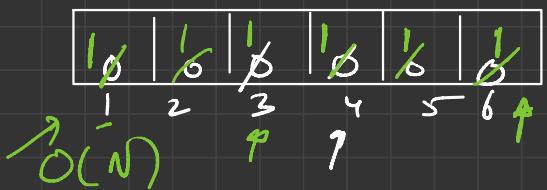
for ($i = 1$ to n)

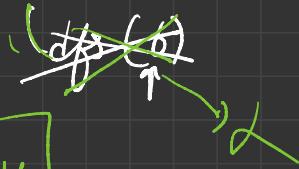
if (!vis[i])
dfs(i)

{

$T.C \rightarrow O(N + \Sigma)$

$S.C \rightarrow \text{Linear}$





ans :- $\boxed{1, 2, 3, 5, 4}$

adj

$$\begin{aligned} 1 &\rightarrow 2, 3 \\ 2 &\rightarrow \boxed{5} \\ 3 &\rightarrow \boxed{5} \\ 5 &\rightarrow \boxed{4} \\ 4 &\rightarrow \text{X} \end{aligned}$$

$\boxed{\text{BFS}}$ = queue

Kahn's algo

L

$\frac{-1}{\text{front} = 1}$

$\overline{4}$, neighbor

$2 \downarrow, 3 \downarrow$

$\text{front} = 4$

\overline{N}

swlgyc

$\text{front} = 2$

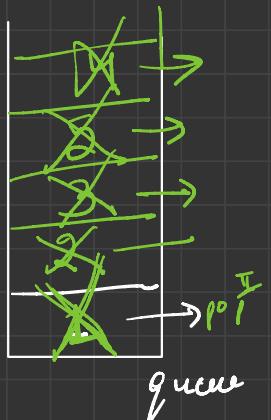
neighbor

$5 \downarrow$

$1 \downarrow$

indegree

0	0	0	0	0
1	2	3	4	5



1 (4)

$\text{front} = 3$

neighbor

$5 \downarrow$

$0 \downarrow$

$\text{front} = 5$

\overline{N}

$\overline{4}$

\downarrow

0

① find indegree of all nodes

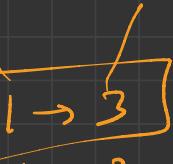
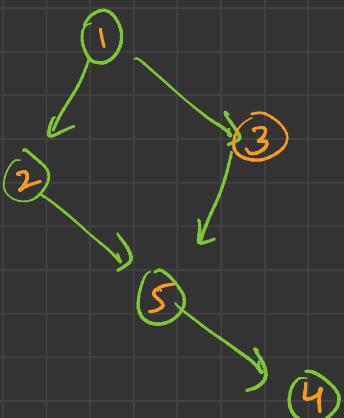
$$T \rightarrow O(N + \Sigma)$$

② queue \rightarrow $O \rightarrow$ indegree nodes
 \downarrow insert

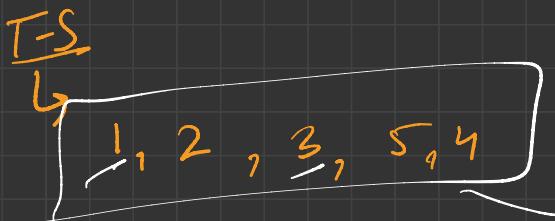
$$S \rightarrow \underline{\underline{O(N + \Sigma)}}$$

linear

③ do Bfs



1 \rightarrow 3
1 \rightarrow 2
2 \rightarrow 5
3 \rightarrow 5
5 \rightarrow 4



Valid T-S

