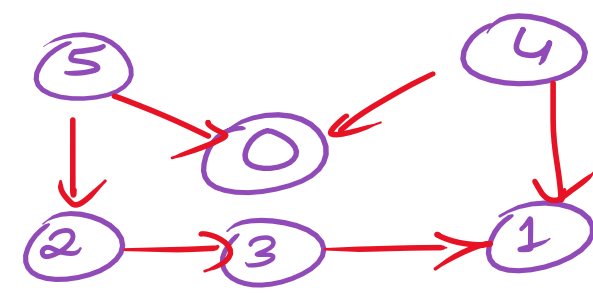


Topological Sort: (DAG) $0 \rightarrow 2$

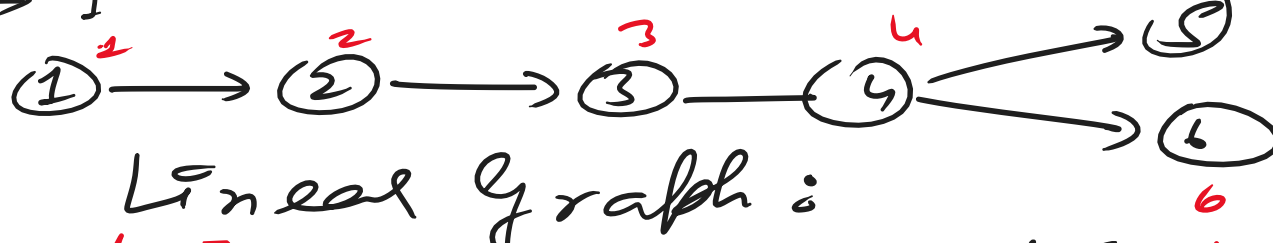


* Ans 1: 5 4 2 3 1 0

* Ans 2: 4 5 2 3 1 0

Edges: \rightarrow

5 \rightarrow 0 2 \rightarrow 3
5 \rightarrow 2 3 \rightarrow 1
4 \rightarrow 0
4 \rightarrow 1



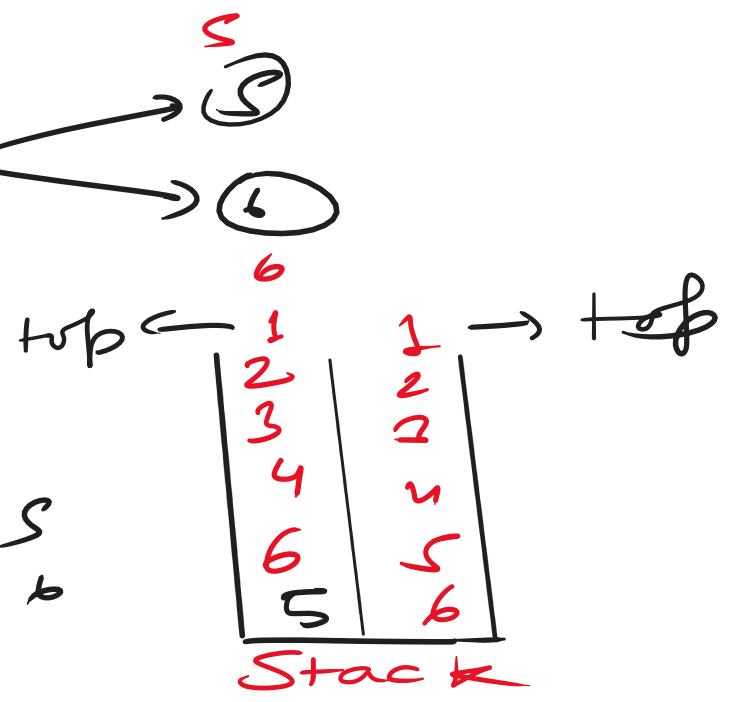
Linear Graph:

[Remember]

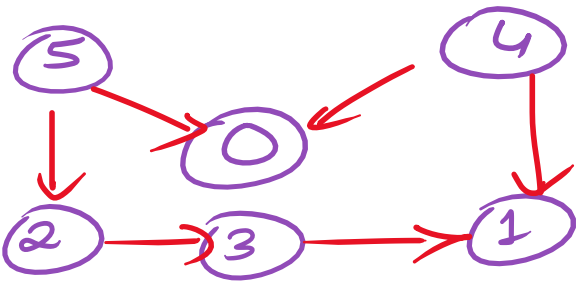
** A linear graph is

always topo sorted: \rightarrow

remove \rightarrow 1, 2, 3, 4, 6, 5
 $u \rightarrow v$ 1, 2, 3, 4, 5, 6
 u before v



Topological Sort - DFS \rightarrow DAG \rightarrow



O/p \rightarrow 5, 4, 2, 3, 1, 0

Note: u before v

We do component

wise traversal:

loop \rightarrow 0 to $n-1$

$n \rightarrow$ nodes

(0, 1, 2, 3, 4, 5) loop ends

dfs(0) \rightarrow
dfs(1) \rightarrow
dfs(2) \rightarrow
dfs(3) \rightarrow
dfs(4) \rightarrow
dfs(5) \rightarrow

Adj List

0 \rightarrow

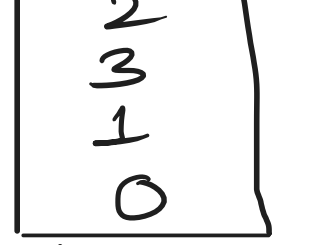
1 \rightarrow

2 \rightarrow 3

3 \rightarrow 1

4 \rightarrow 0, 1

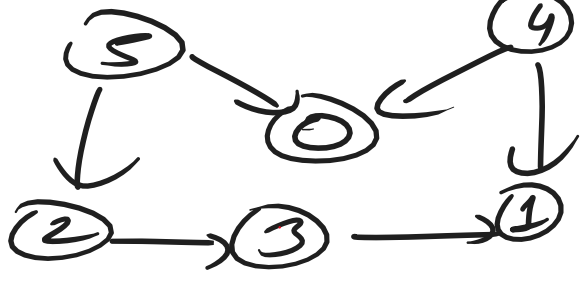
5 \rightarrow 0, 2



Topological Sort & BFS Kahn's Algorithm

$u \rightarrow v$ [Linear Ordering]

(u comes before v)



Step 1: Insert all nodes with in-degree '0' into queue

Step 2: Take out the node from queue & reduce

O/p: 4 5 0 2 3 1

Step 1:
Insert all nodes with in-degree '0' into queue

Adj List
0 -
1 -
2 - 3
3 - 1
4 - 0, 1
5 - 0, 2

O/p: 4 5 0 2 3 1

Indegree \rightarrow No of incoming nodes to a particular node.

O/p: 4 5 0 2 3 1

Topo Sort: DAG \rightarrow Linear Ordering

* If we cannot apply topo sort to a directed graph, what does that mean?

Ans: \rightarrow Cycle Detected

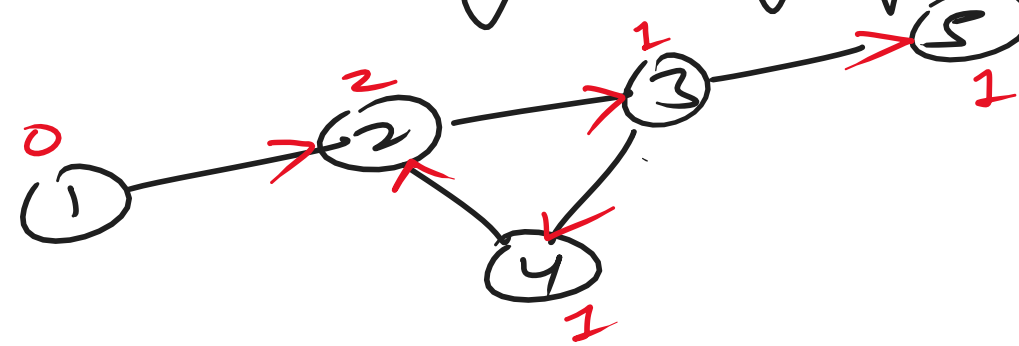
* When we are done with the topo sort \rightarrow the linear ordering = N or V

if not, then there's a cycle.

$N = V$ \rightarrow no cycle
 $N \neq V$ \rightarrow cycle

Topo Sort BFS Kahn's Algo

Directed Cyclic Graph \rightarrow Cycle Detection



Indegree: 0 1 1 1 1

Topo sort o/p \rightarrow 1 \neq N or V

TS = N \oplus false
TS \neq N \oplus true

Adj List
 \rightarrow 1 \rightarrow 2
2 \rightarrow 3
3 \rightarrow 4, 5
4 \rightarrow 2
5 \rightarrow

* 2 questions
* Kosaraju's (SCC) (CLC)
* Dijkstra's (SQL)
* DP

MySQL
workbench

port \rightarrow 3306
local host

\rightarrow user
 \rightarrow pwd

(CRUD) \rightarrow Java - JDBC