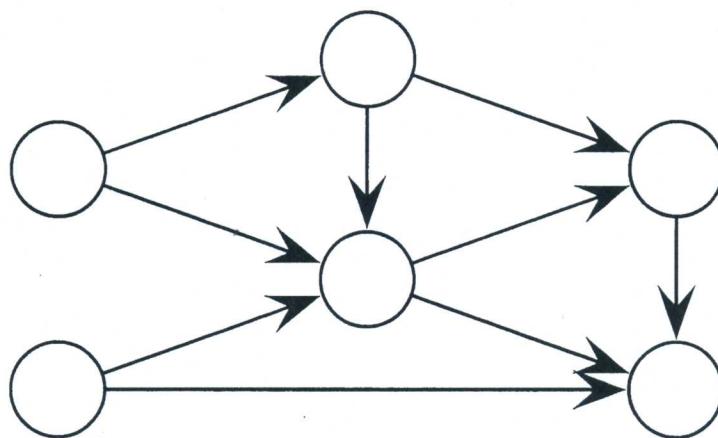


Topological Sorting

Given a directed network (DAG)
Can we index the nodes such that all
directed arcs satisfy (i, j) if $i < j$.

Example



$$p_{i,k} = k$$

$$p_{i,k} = \begin{cases} p_{i,j} & \text{if } d_{i,k} > d_{i,j} + d_{j,k} \\ \text{same} & \text{if } d_{i,k} \leq d_{i,j} + d_{j,k} \end{cases}$$

The Floyd-Warshall algorithm finds all shortest paths without negative cycles.

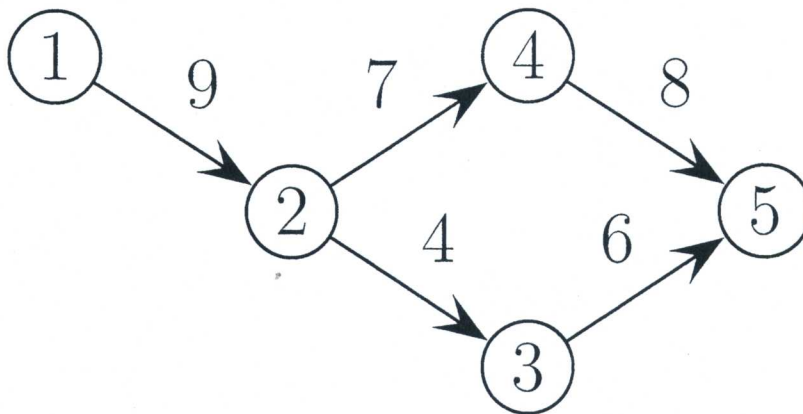
Floyd-Warshall algorithm creates basic arcs
updated from $j = 1, \dots, n$.

Problem: Network is too large

Problem: $\exists$ negative cycles

Power Failure?

What happens if power is shut down?



$j = 1$, all $i, k \neq j$

$j = 2$, all $i, k \neq j$

$j = 3$, all $i, k \neq j$

Power shuts down...

Power Failure?

	①	②	③	④	⑤
①	0	9	∞	∞	∞
②	∞	0	4	7	∞
③	∞	∞	0	∞	6
④	∞	∞	∞	0	8
⑤	∞	∞	∞	∞	0

After $j = 3$, all $i, k \neq j$