

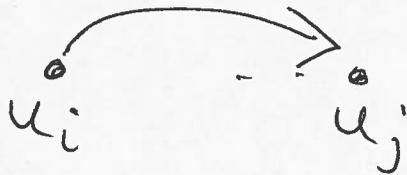
# Topological Ordering

Input: Directed graph  $G = (V, E)$

(Assume:  $G$  is a DAG) Ex: Remove this assumption.

Output: An ordering  $u_1, \dots, u_n$

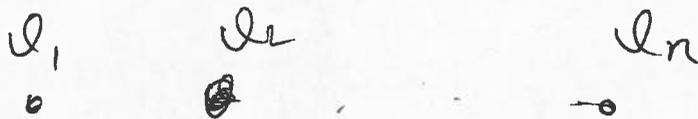
s.t. if  $(u_i, u_j) \in E \Rightarrow i < j$



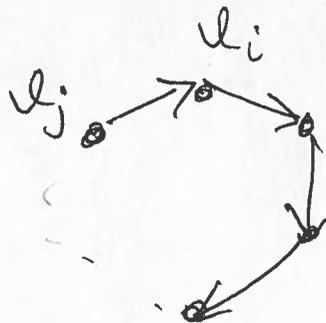
Prop: If  $G$  has a topological ordering, then  $G$  is a DAG.

P.f.: Pf by contradiction.

Ass



but  $G$  has a directed cycle.



Let  $i$  be the smallest index s.t.  $u_i \in C$ .

$(u_j, u_i) \in E$

but  $j > i$

$\Rightarrow (u_j, u_i)$  is a back edge