

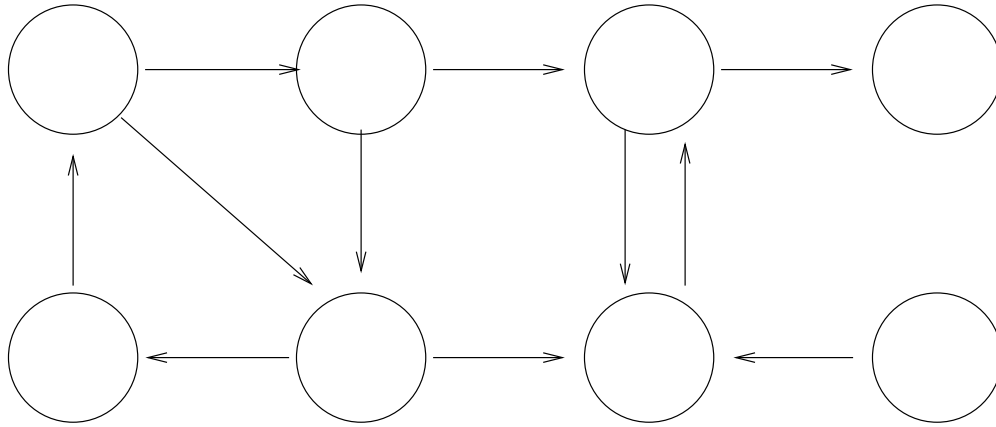
# Strongly Connected Components

**Definition** A strongly connected component of a directed graph  $G$  is a maximal set of vertices  $C \subseteq V$  such that for every pair of vertices  $u$  and  $v$ , there is a directed path from  $u$  to  $v$  and a directed path from  $v$  to  $u$ .

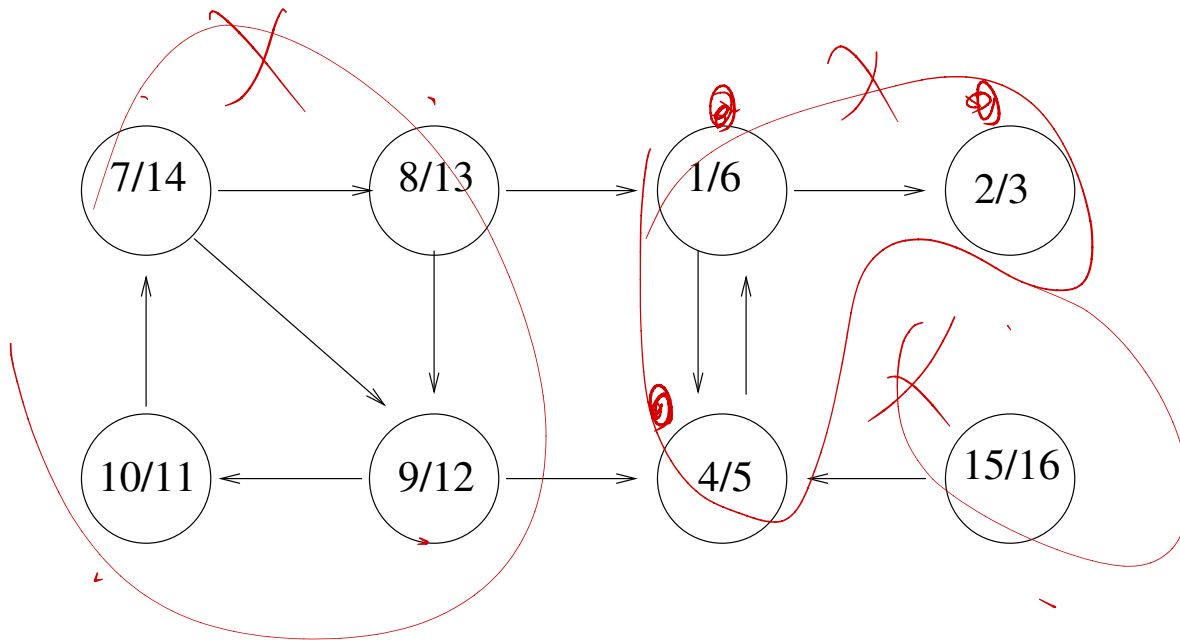
Strongly-Connected-Components( $G$ )

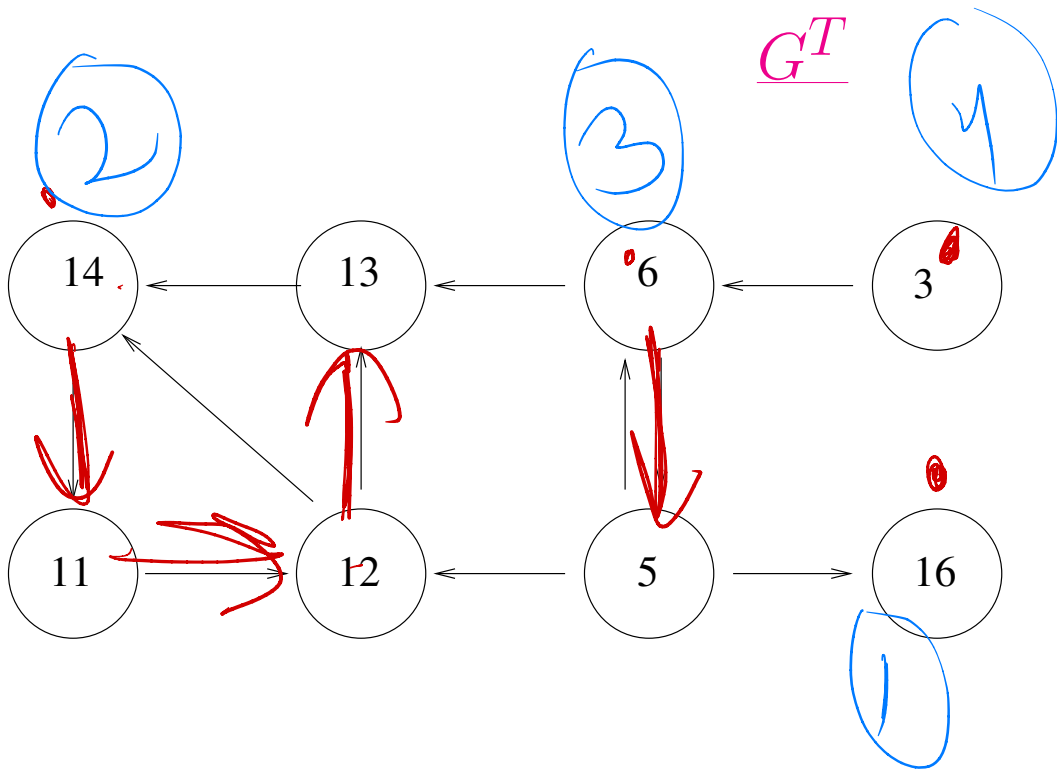
- 1 call DFS( $G$ ) to compute finishing times  $f[u]$  for each vertex  $u$
- 2 compute  $G^T$
- 3 call DFS( $G^T$ ), but in the main loop of DFS, consider the vertices  
in order of decreasing  $f[u]$  (as computed in line 1)
- 4 output the vertices of each tree in the depth-first forest formed in line 3 as a  
separate strongly connected component

## Example

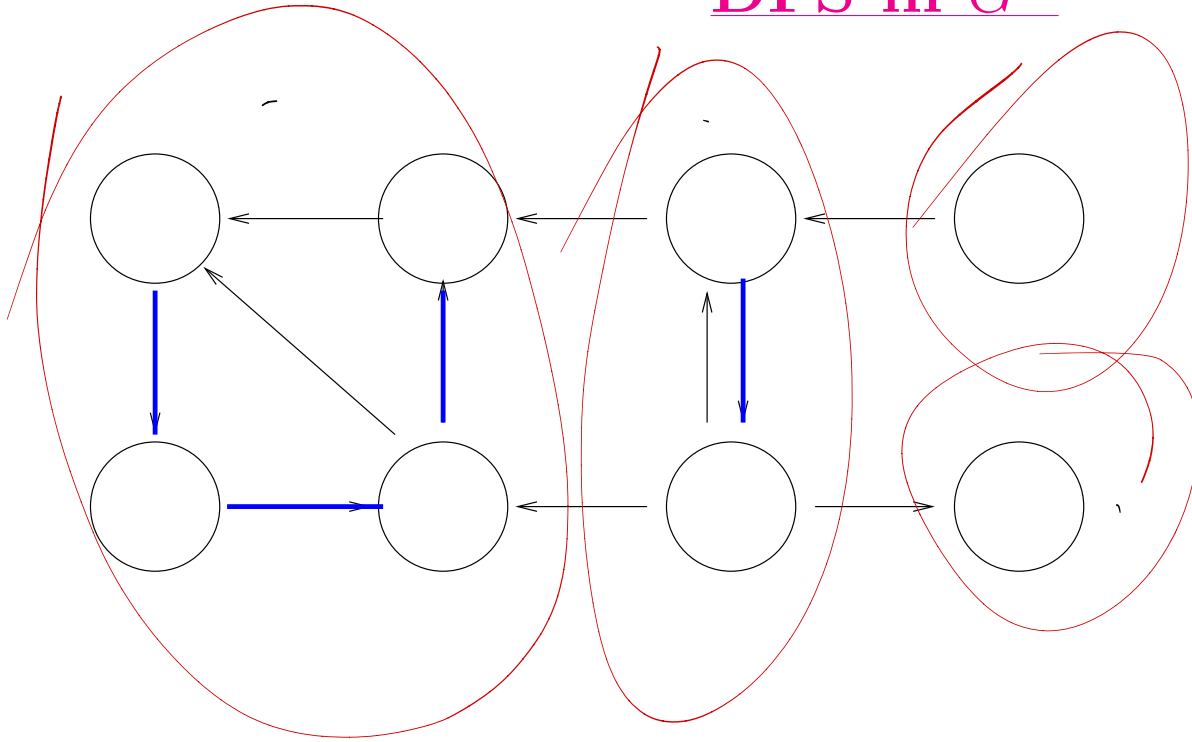


# DFS

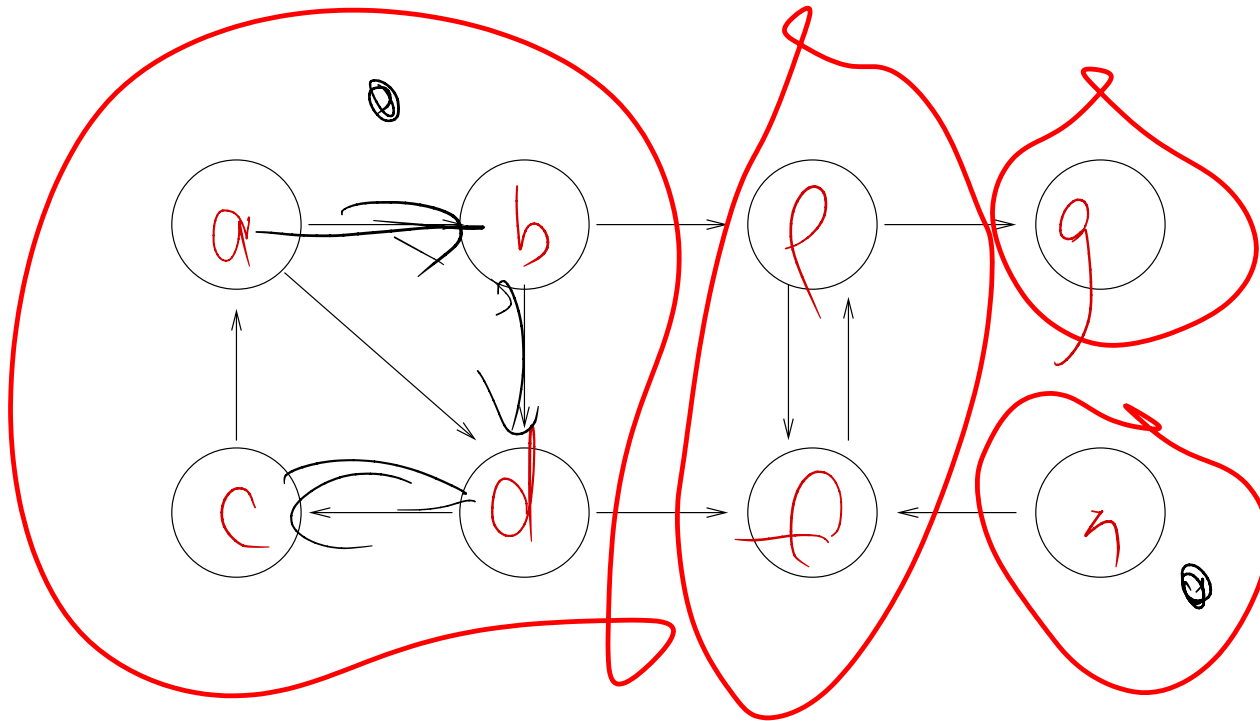




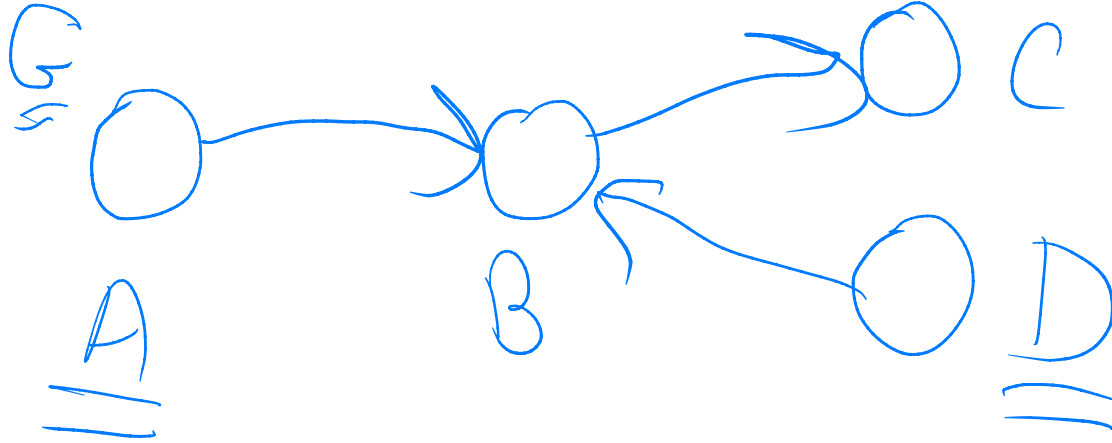
## DFS in $G^T$



# Solution



largest  $f$   
must be  
in a  
component  
w/ no  
incoming edges



$G^T$

largest  $f$  is  
in a component  
w/ no  
outgoing edges