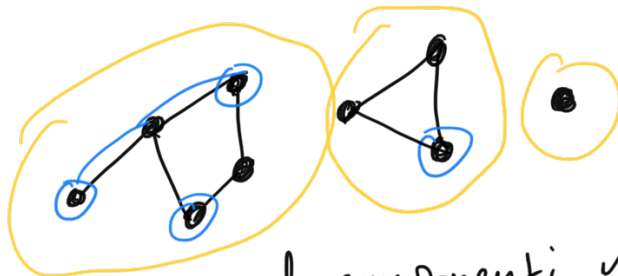


# Lecture 1:

## Connected components of graphs:



Connected component: maximal subset of vertices such that any pair can be joined by a path of edges.

$G$  is connected if it consists of just one connected component.

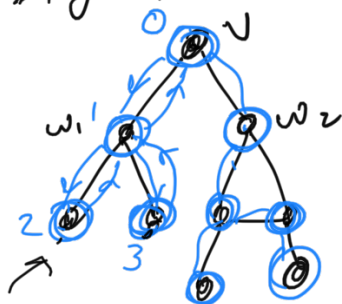
Q: How to determine whether a graph is connected?

Q: How to produce a list of connected components?

Will answer today

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Algorithm: Depth-First Search/Exploration

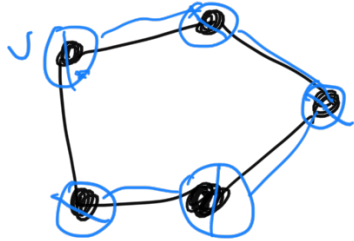


connected component of

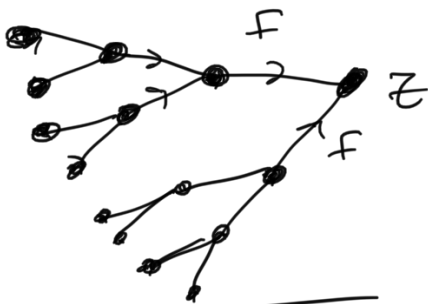
To explore  
some vertex  $v$ :

- explore( $v$ )
- ① Start at vertex  $v$ . Label  $v$  as visited.
  - ② Generate a list of neighbors  $w_1, \dots, w_n$
  - ③ For each  $w_i$ , if  $w_i$  has not been visited, explore starting at  $w_i$  (recursively, i.e.  $\text{explore}(w_i)$ )

Example



Example (Inverse Iteration From Proj 2)



To implement:

- Decide how to represent graph (adjacency matrix)
- Produce list of neighbors of some vertex  $v$

- Keep track of which have  
been visited

J