Lecture 5: Undirected connectivity

An undirected graph is \textit{connected} if there is a path between any pair of nodes.

This graph has \textit{2 connected components}.

\texttt{explore(G,v)} returns the connected component containing \(v\).
To explore the rest of the graph, restart \texttt{explore()} elsewhere.

\textsl{DFS decomposes an undirected graph into its connected components!}
Running time analysis

procedure explore(G,v)
visited[v] = true
for each edge (v,u) in E:
    if not visited[u]:
        explore(G,u)

procedure dfs(G)
for all v in V:
    visited[v] = false
for all v in V:
    if not visited[v]:
        explore(G,v)

How long does dfs(G) take?

explore(G,v) is called exactly once for each node v.
DFS search forest

Terminology:
*DFS search forest* consisting of two *DFS search trees*

- **Tree edge**: traversed by DFS
- **Back edge**: not traversed (led to a node already visited)