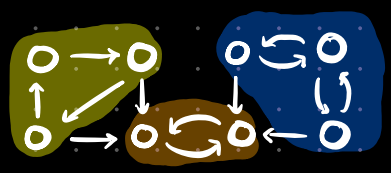
Strongly Connected Components

- A strongly connected component is the portion of a directed graph in which there is a path from each vertex to another vertex
  ↳ has to be directed



Graph w/ 3 SCC's

Kosaraju's Algorithm

- An algorithm that finds the SCC's of a given, directed graph. Kosaraju's algorithm uses a DFS to help find the SCC's.

- This algorithm consists of the following main phases:

  ① First DFS Phase (TopSort)

  - Find topological ordering of the graph

  ② Reverse (Transpose) Graph

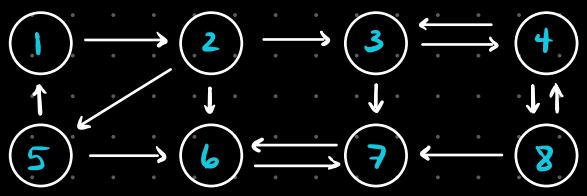
  - Reverse direction of all edges in the directed graph

  ③ Second DFS Phase

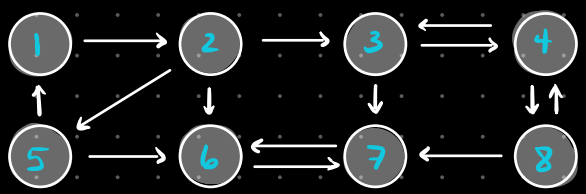
  - Identify SCC's by starting DFS from each popped vertex based on their finishing times obtained in the First DFS Phase.

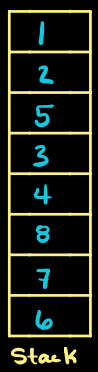
Example:

"Given the following directed graph, find the SCC's"

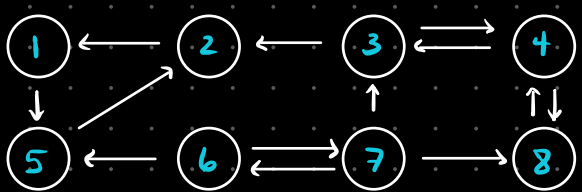


① Find topological sort of graph



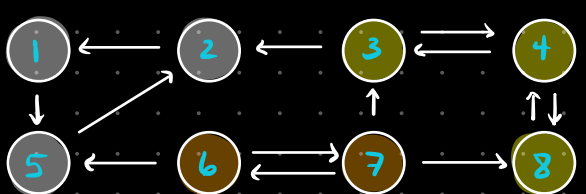


② Transpose Graph (Reverse directed edges)



③ Perform DFS on stack elements to find SCC's

- Idea is that the nodes you visit on a node's DFS are all SCC's



{1, 5, 2} is our first SCC

↳ since 5 and 2 have now been visited, omit from stack

{3, 4, 8} are second SCC

{7, 6} are third SCC