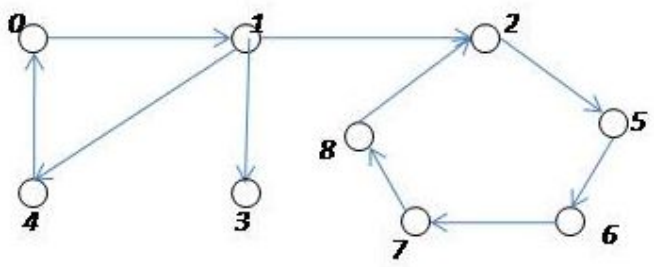
ESO207: Data Structures and Algorithms

Programming Assignment *2* *Due: 31 October 2017*

Problem 1. Given a directed unweighted graph $G = (V, E)$, print the strongly connected component graph $G^{\text{SCC}} = (V^{\text{SCC}}, E^{\text{SCC}})$. The input-output details are as follows.

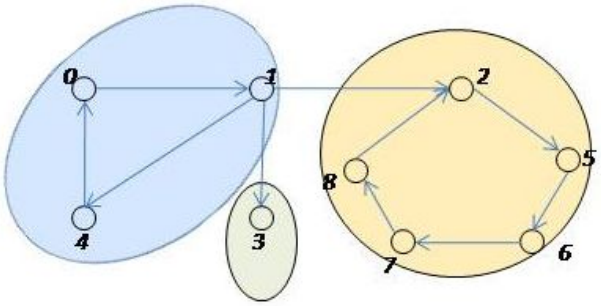
Input: The graph is given in the adjacency list format. The first number is n, the number of vertices, which will be an integer ≥ 1. The vertex set is assumed to be $V = \{0, 1, \ldots, n-1\}$. Following this number n , there are n lines, where, the ith line corresponds to the adjacency list of node numbered i. Each adjacency list is a sequence of vertex ids (between 0 and $n-1$) and ends with -1. For example, suppose that the adjacency list for the vertex 1 is
0 $35-1$
This shows that the outgoing edges from 1 are $(1,0), (1,3)$ and $(1,5)$. The following is a more detailed example.

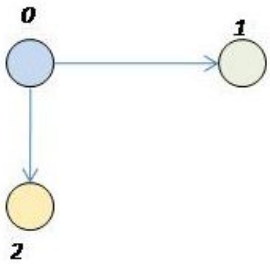


The corresponding representation of the graph is as follows.

9
1 -1
0 4 3 2 -1
5 -1
-1
0 -1
6 -1
7 -1
8 -1
2 -1

The output should be the directed acyclic graph G^{SCC} represented in the same notation along with some conventions. For the above example, the G^{SCC} is represented below as follows.





The number of strongly connected components is 3. The output should be

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3
1 2 -1
-1
-1
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