Student Name: _____          J#: _____

# CSC 641 Network Science
## Instructor: Dr. Natarajan Meghanathan, Fall 2015

**Take Home Quiz 1 (Due: September 30, 2015, 6 PM)**          **Max. Points: 75**

**Late submission (Sept. 30, 2015-6:15 PM to Oct. 1, 2015-6 PM: -30 points, taken off from your score)**
**Late submission (Oct. 1, 2015-6:01 PM to Oct. 2, 2015-6 PM:   -60 points, taken off from your score)**
**No late submission allowed after Oct. 2, 2015-6 PM.**

Try to answer in the space provided itself. Do not print front and back (print only one page per sheet). Use additional sheets as necessary. Clearly indicate your name and J# in each of the additional sheets.

1) a) (20 pts: 10 pts each) Determine whether the following graph (assigned to you below) is bipartite or not using the following independent approaches: (i) Breadth First Search, starting from Vertex 0; (ii) Eigenvalue-based bipartivity index. If the graph is bipartite, determine the two partitions under each of the above approaches.
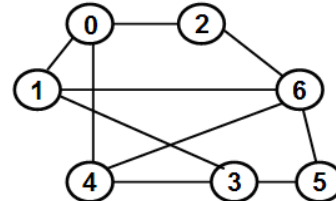b) (10 pts) Add two edges of your choice between vertices that do not yet have an edge. For the modified graph, determine the bipartivity index using the Eigenvalue-approach and the two partitions of vertices that make the graph "truly" bipartite or "close-to" bipartite depending on the case.
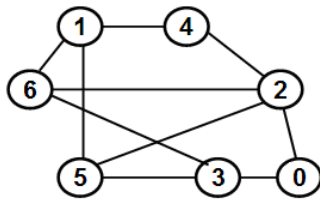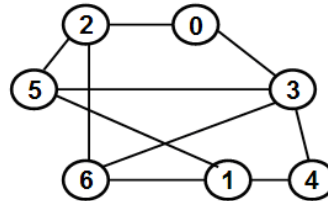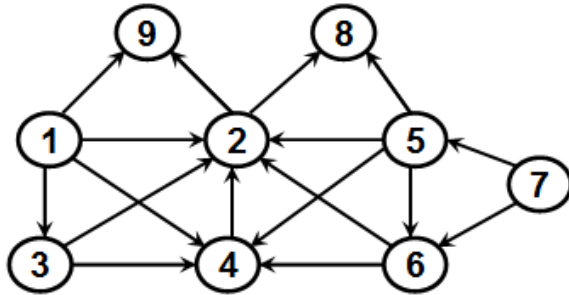


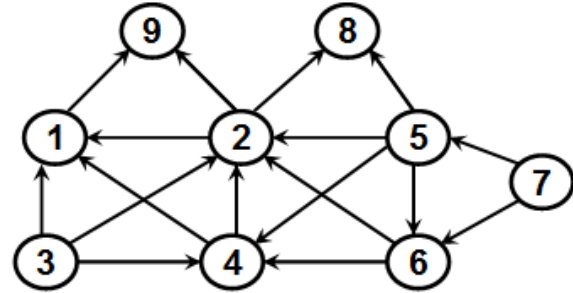Yashwanth Divanji          Karthik Reddy Aeddula          Anirudh Reddy

2) (10, 10, 10, 15 pts) For the directed graph assigned to you below, determine the following. Show all the work:
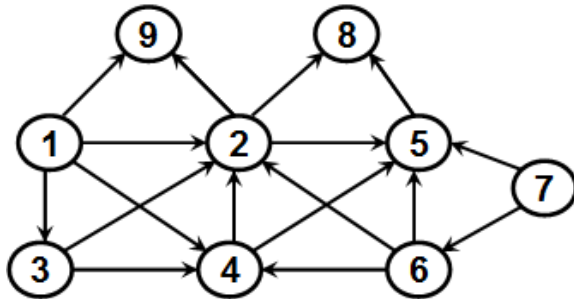
i) Cocitation coupling matrix. Determine the pair(s) of vertices that are most strongly coupled.

ii) Bibliographic coupling matrix. Determine the pair(s) of vertices that are most strongly coupled.

iii) A topological sort of the vertices and an upper triangular version of the adjacency matrix

iv) Strongly connected components. If each component has only one vertex, explain why?


Yeshwanth Divanji


Karthik Reddy Aeddula


Anirudh Reddy