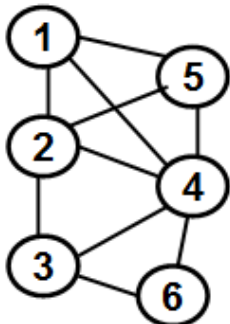


CSC 641 Network Science, Fall 2019
Exam 1 (Take Home: Due: Sept. 26, 2019: 7.30 PM)

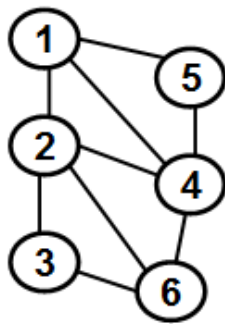
Total: 100 pts

Hardcopy (Neatly written or typed), due in Class

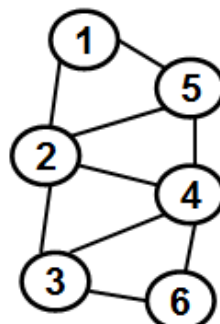
- 1) (20 pts) For the graph given below:
 (a - 9 pts) Find the probability distribution for the degree of the vertices
 (b - 4 pts) Use the probability distribution of (a) to determine the average degree of the vertices in the graph.
 (d - 13 pts) Determine the average local clustering coefficient of the vertices in the graph.
 (g - 12 pts) Determine the number of walks of length 4 between vertices 1 and 3.



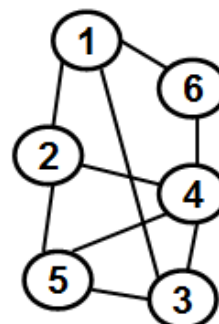
Champion, Jeremy



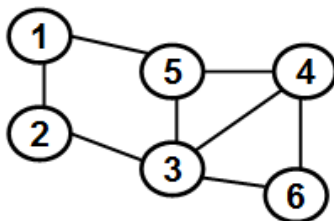
Deanes, Marcus



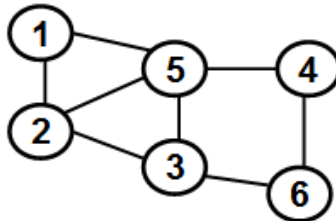
Evans, Rashad



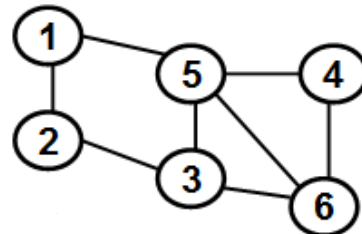
Gammons, Allee



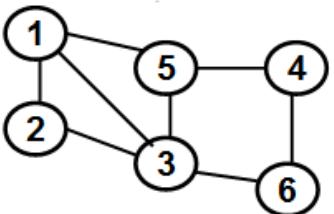
Jones, Quincy



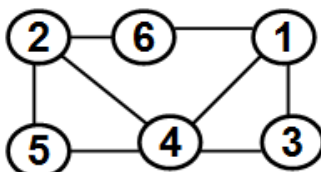
Lewis, Devario



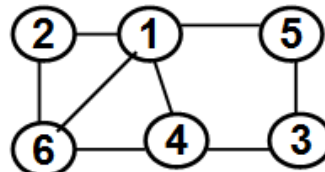
Maduka, Chidiebere



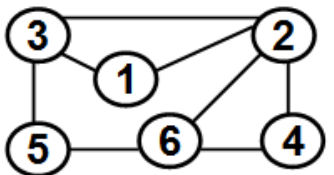
Ukpebor, Augustine



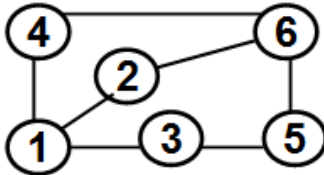
Valliappan, Vallimanan



Xu, Ran



Zhang, Xuecen



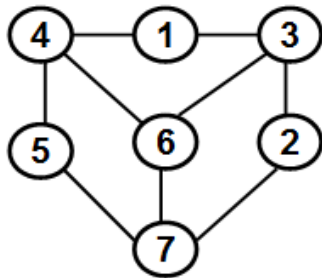
Gebre, Amanuel Engeda

2) (25 pts) The graph given below is bipartite.

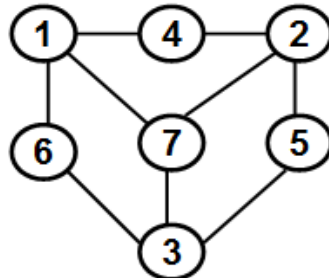
(a) Use the Breadth First Search (BFS) algorithm to determine the two partitions of the graph.

(b) Let the smaller partition determined from (a) be considered as the "Vertex Set" and the larger partition be considered as the "Group Set". Find the Group Projection of the bipartite graph.

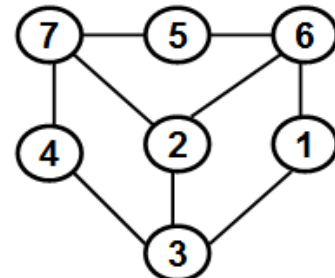
Show all the work.



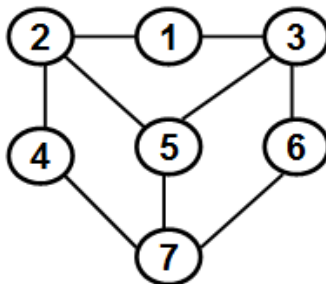
Champion, Jeremy



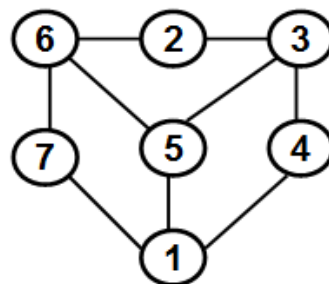
Deanes, Marcus



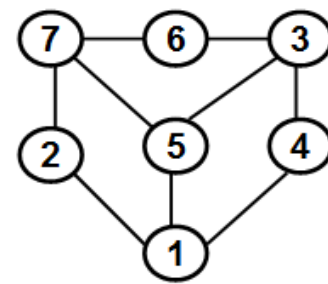
Evans, Rashad



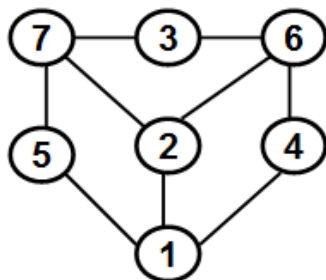
Gammons, Allee



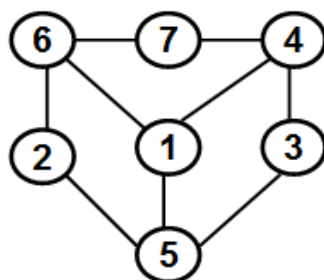
Gebre, Amanuel



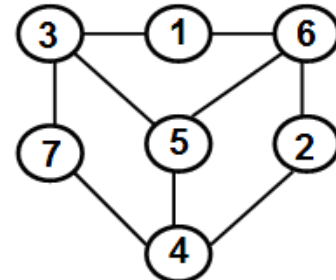
Jones, Quincy



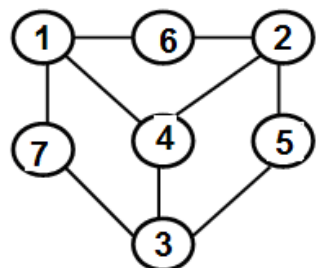
Lewis, Devario



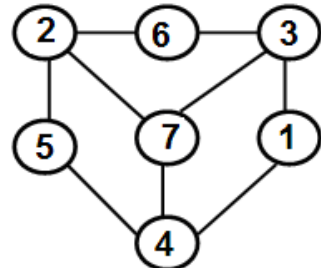
Maduka, Chidiebere



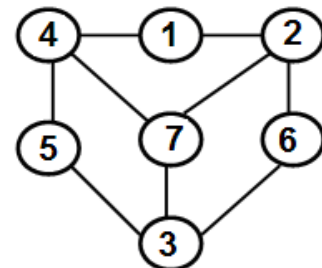
Ukpebor, Augustine



Valliappan, Vallimanalan

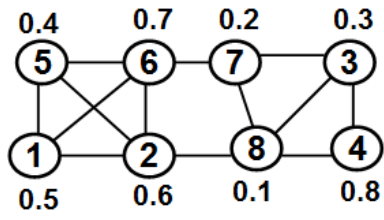


Xu, Ran

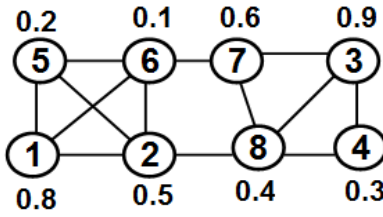


Zhang, Xuecen

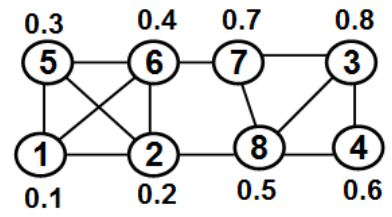
3) (35 pts) Determine the **maximal node matching** and **maximal assortative matching** for the following graph. Determine the following for each of the above: (i) the set of edges constituting the matching (ii) the % of node matches (iii) assortative index of the matching.



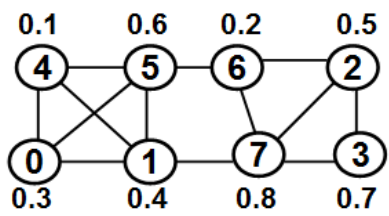
Champion, Jeremy



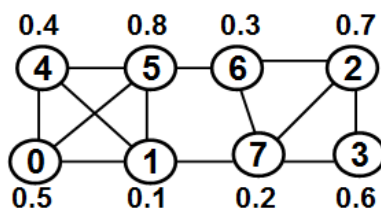
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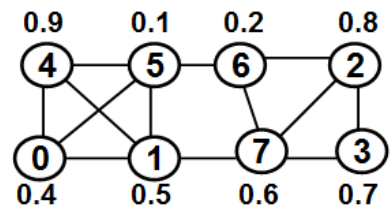
Evans, Rashad



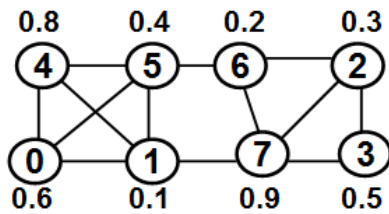
Gammons, Allee



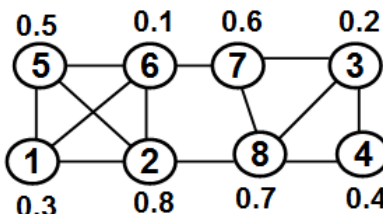
Gebre, Amanuel



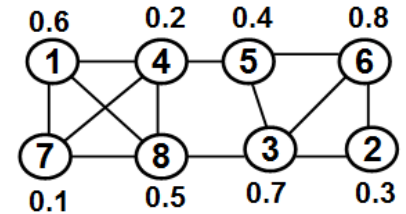
Jones, Quincy



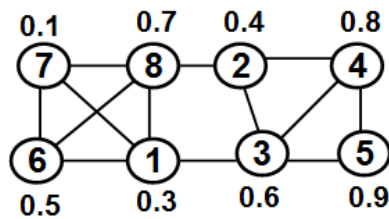
Lewis, Devario



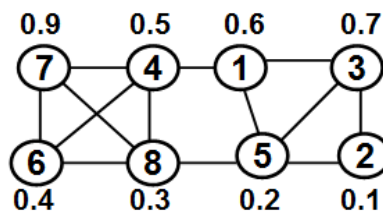
Maduka, Chidiebere



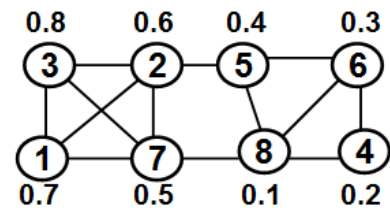
Ukpebor, Augustine



Valliappan, Vallimanalan

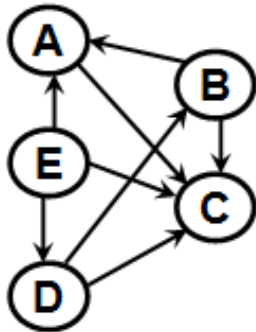


Xu, Ran

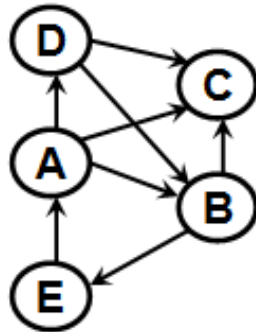


Zhang, Xuecen

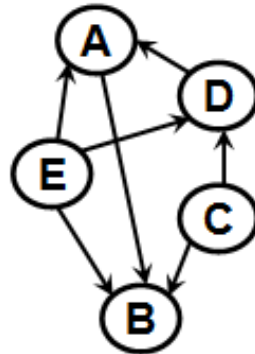
- 4) (20 pts) For the directed graph assigned to you below, determine the following:
 i) Cocitation coupling matrix. Determine the pair(s) of vertices that are most strongly coupled.
 ii) Bibliographic coupling matrix. Determine the pair(s) of vertices that are most strongly coupled.



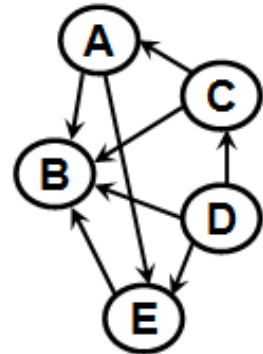
Champion, Jeremy



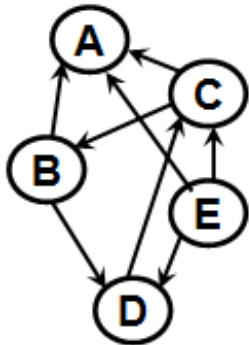
Deanes, Marcus



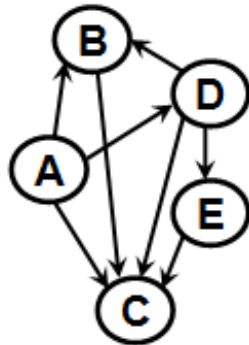
Evans, Rashad



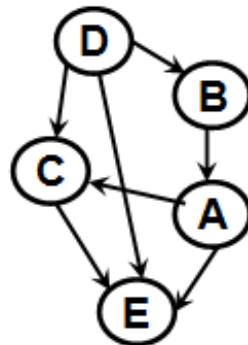
Gammons, Allee



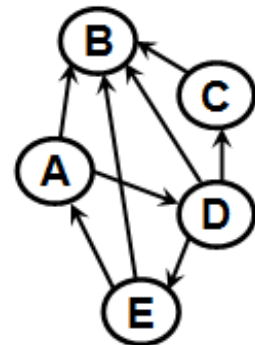
Jones, Qunicy



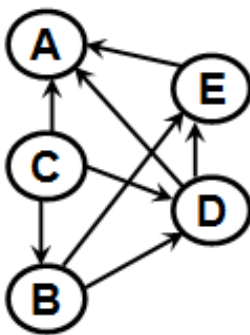
Lewis, Devario



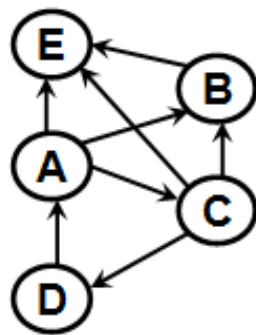
Maduka, Chidiebere



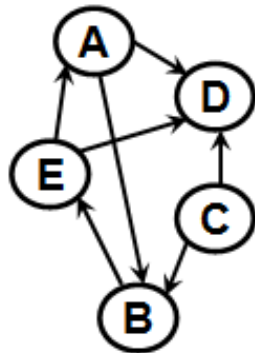
Amanuel, Gebre



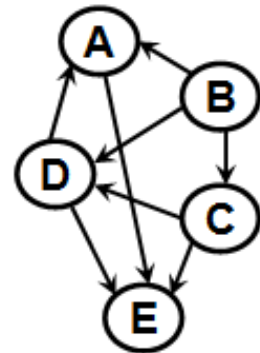
Ukpebor, Augustine



Valliappan, Vallimananal



Xu, Ran



Zhang, Xuecen