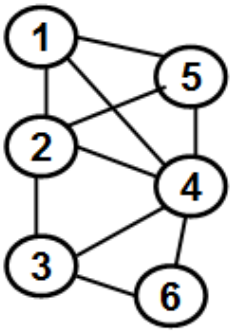
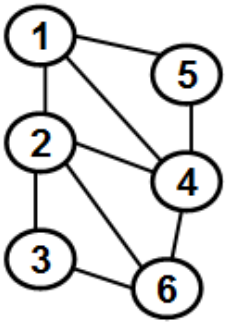
Student Name: _____ J#: _____

CSC 641 Network Science, Fall 2017
Exam 1 (Take Home: Due: Sept. 28, 2017: 6 PM) **Total: 100 pts**

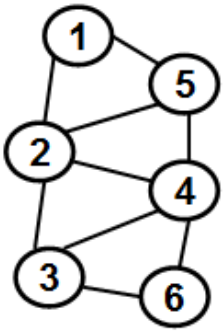
1) **(75 pts)** For the graph given below:
(a - 9 pts) Find the probability distribution for the degree of the vertices
(b - 4 pts) Use the probability distribution of (a) to determine the average degree of the vertices in the graph.
(c - 5 pts) Determine the spectral radius ratio for node degree.
(d - 13 pts) Determine the average local clustering coefficient of the vertices in the graph.
(e - 10 pts) Determine the algebraic connectivity of the graph.
(f - 12 pts) Determine the Estrada index for protein folding for the graph assigned to you as well as determine the folding effectiveness.
(g - 12 pts) Determine the number of paths of length 4 between vertices 1 and 3.
(h - 10 pts) Determine the bipartivity index of the graph, the two partitions and identify the frustrated edges, if any.



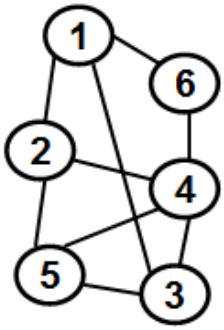
Alton Franklin



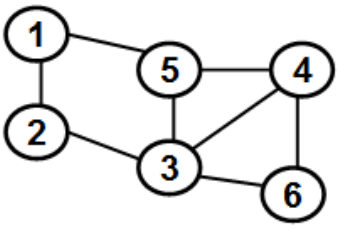
Chirone Gamble



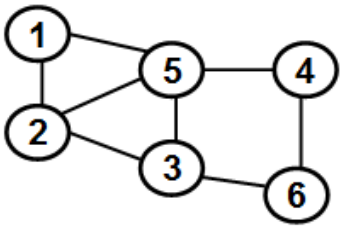
Robin Ghosh



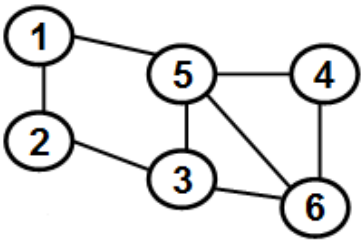
Eric Jackson



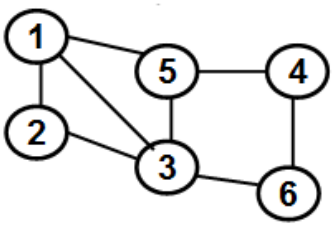
Jonathan Townes



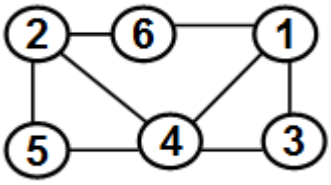
Shengtan Wu



Roman Zubatiuk



Jamoris Miller



Cheronika Manyfield-Donald

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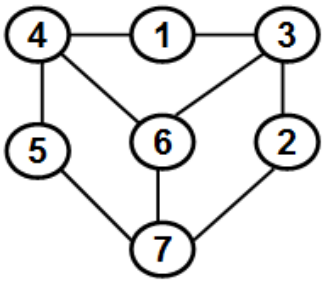
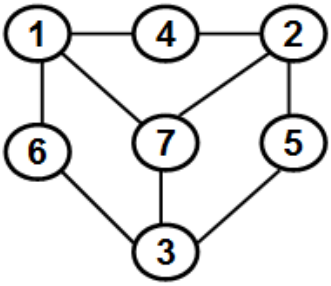
2) **(25 pts)** The graph given below is bipartite.
(a) Use the Breadth First Search (BFS) algorithm to determine the two partitions of the graph.
(b) Let the smaller partition determined from (a) be considered as the "Vertex Set" and the larger partition be considered as the "Group Set". Find the Group Projection of the bipartite graph.
Show all the work.



Alton Franklin



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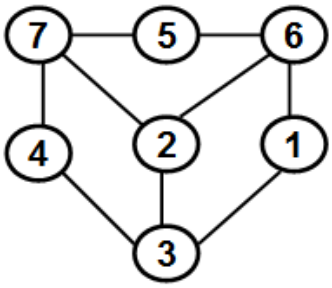
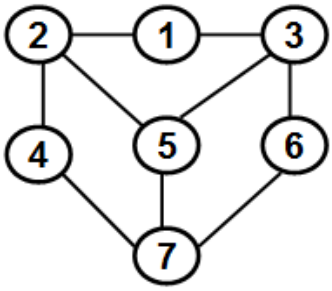
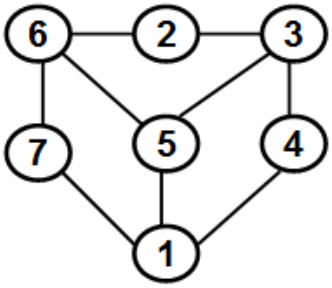


Robin Ghosh



Jonathan Townes



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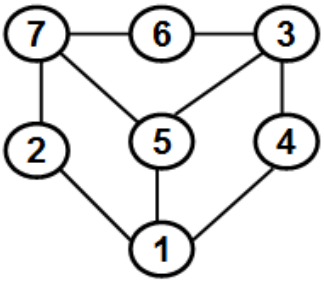

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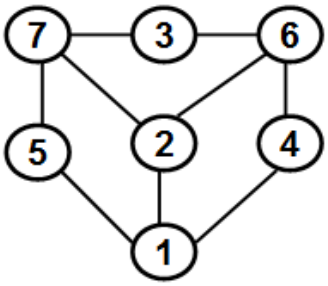
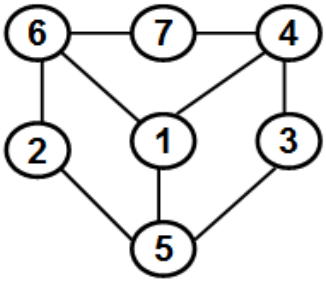


Eric Jackson



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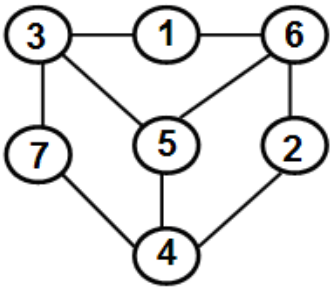

Cheronika Manyfield-Donald