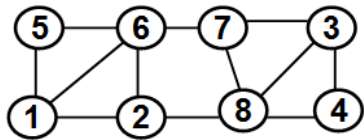


CSC 641 Network Science, Fall 2018
Exam 3 (Take Home: Due: Oct. 23rd, 2018: 7.30 PM)

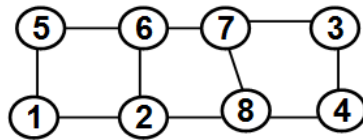
Total: 100 pts

Print this Exam, Insert your answer sheets in between the questions and submit the final exam with all papers stapled.

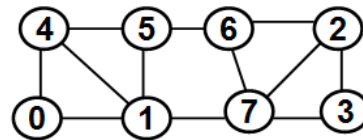
- 1) (20 pts) For the graph assigned to you:
- (a) Find the LCC'DC values for the vertices
 - (b) Use the Node BWC java executable program to determine the BWC values for the vertices
 - (c) Find the Pearson's correlation coefficient (using the formula) between the LCC'DC and the BWC values.
 - (d) Fit a linear regression line for $BWC = f(LCC'DC)$ and determine the slope and intercept as well as the R2 of the fit.
 - (e) Use the regression line of (d) to predict the BWC values based on the actual LCC'DC values. Determine the Standard Error (SER) for the predicted BWC values vis-a-vis the actual BWC values determined in (b).



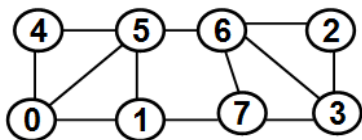
Dave, Hitanshu



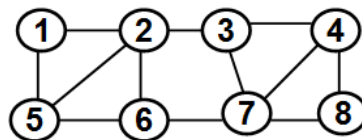
Davis, Carolyn



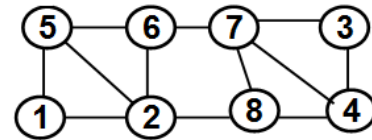
Evans, Rashad



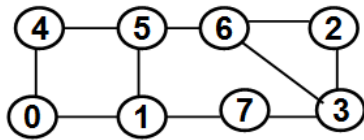
Fiesha, Temesgen



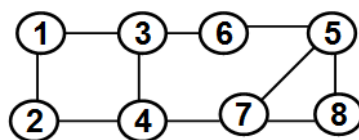
Ramos, Ciji



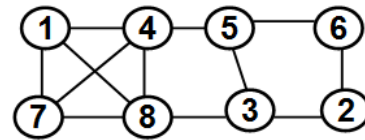
Sarker, Md Imran



Tutika, Raj



Whitfield, Nicholas

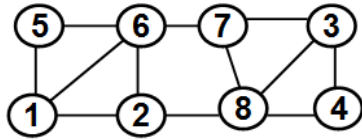


Faris, Amanuel

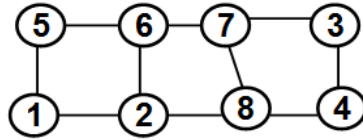
Student Name: _____

J#: _____

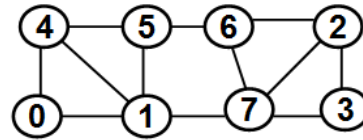
2) (15 pts) For the graph assigned to you, use the Breadth First Search algorithm-based approach to determine the BWC of a vertex with respect to the pair y and z: i.e., $BWC(X; Y \text{ and } Z)$.



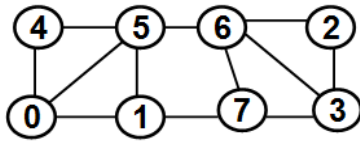
Dave, Hitanshu



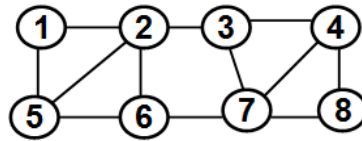
Davis, Carolyn



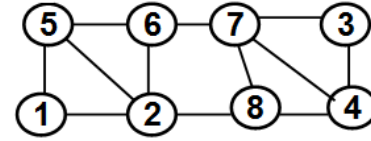
Evans, Rashad



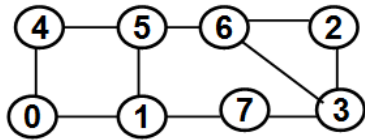
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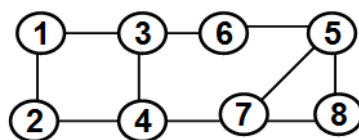
Ramos, Ciji



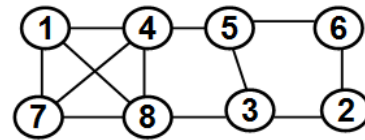
Sarker, Md Imran



Tutika, Raj



Whitfield, Nicholas



Faris, Amanuel

Student	X	Y and Z	Student	X	Y and Z
Dave, Hitanshu	7	1 and 3	Sarker, Md Imran	7	1 and 3
Davis, Carolyn	7	5 and 8	Tutika, Raj	7	0 and 3
Evans, Rashad	7	2 and 4	Whitfield, Nicholas	7	1 and 8
Fiesha, Temesgen	6	0 and 2	Faris, Amanuel	7	1 and 2
Ramos, Ciji	3	1 and 8			

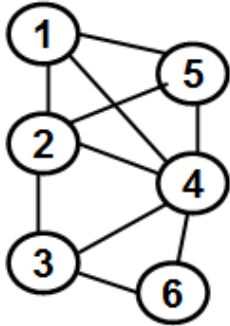
Student Name: _____

J#: _____

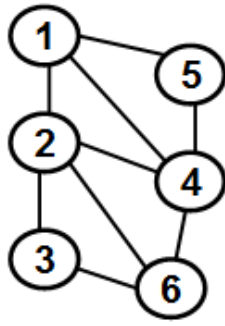
3) (25 pts) For the graph assigned to you, determine the following:

- (1: 2 pts) Degree centrality; (2: 2 pts) Eigenvector centrality; (3: 5 pts) Closeness centrality
(4: 3 pts) Farness centrality;
(5: 6 pts) Determine the Kendall's correlation coefficient between centrality metrics (1) and (3)
(6: 7 pts) Determine the rank-based correlation coefficient between centrality metrics (1) and (2)

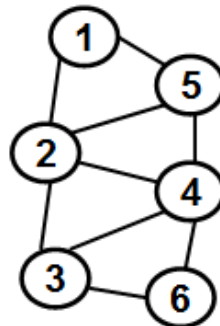
For (2) and (4), you could use the Spectral analysis Java program given to you.



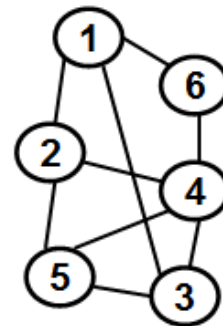
Dave, Hitanshu



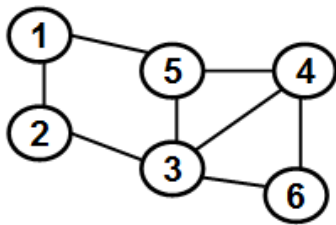
Davis, Carolyn



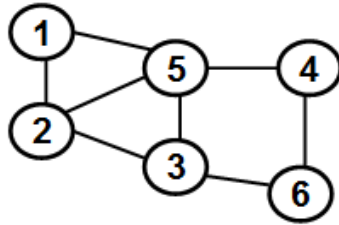
Evans, Rashad



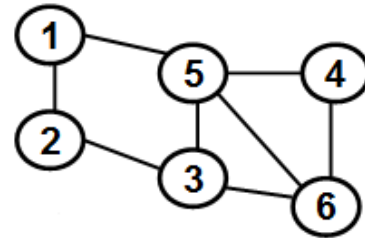
Fiesha, Temesgen



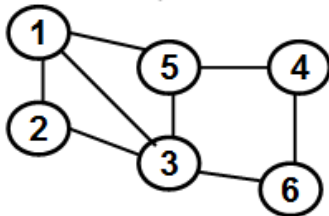
Tutika, Raj



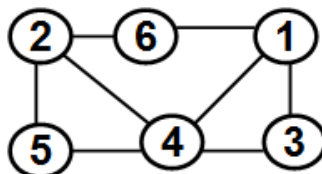
Whitfield, Nicholas



Faris, Amanuel



Ramos, Ciji

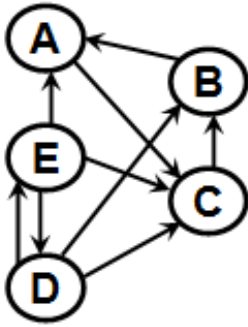


Sarker, Md Imran

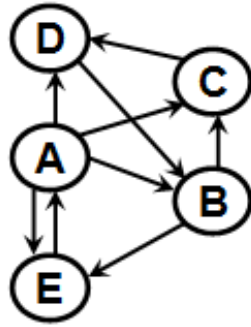
4) HITS: 20 pts

Rank the vertices of the following graph using the HITS algorithm. Find the Authority Scores and Hub Scores of the vertices. Also, if the directed graph has bi-directional edges between two vertices u and v , determine which of the two directed edges ($u \rightarrow v$ and $v \rightarrow u$) dominate.

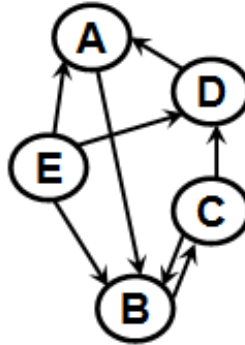
Proceed for four iterations or you could stop if the values converge earlier.



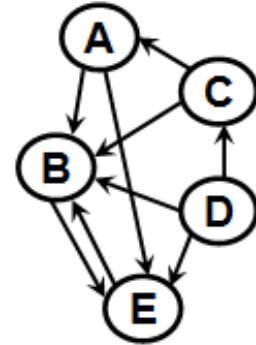
Dave, Hitanshu



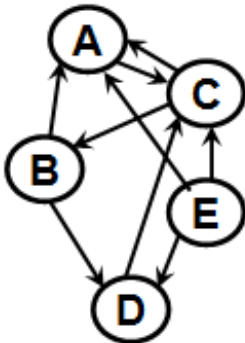
Davis, Carolyn



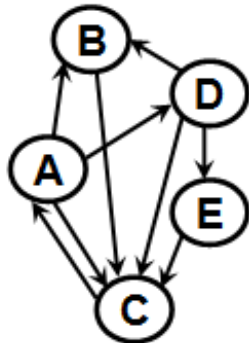
Evans, Rashad



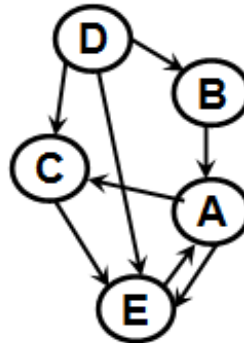
Fiesha, Temesgen



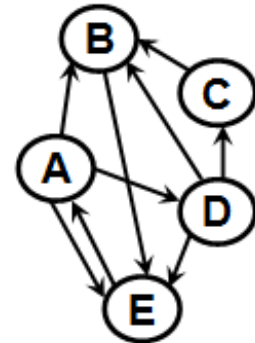
Tutika, Raj



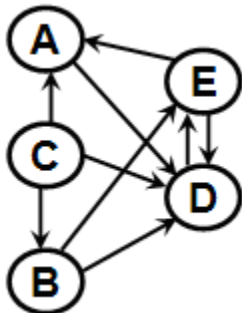
Whitfield, Nicholas



Faris, Amanuel



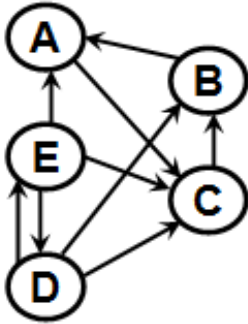
Ramos, Ciji



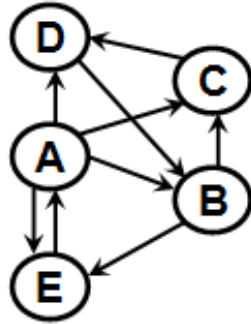
Sarker, Md Imran

5) Page Rank: 20 pts

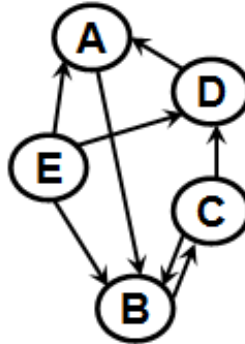
Find the Page Rank scores of the vertices for the directed graph assigned to you. Write the Page Rank formulation for each vertex and show the results of the iterations (calculated in Excel) until the values converge to the first decimal.



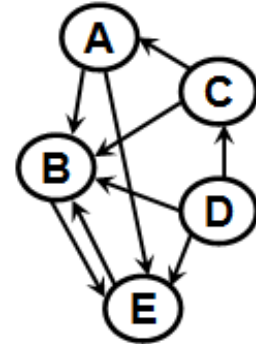
Dave, Hitanshu



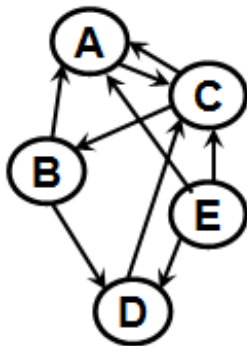
Davis, Carolyn



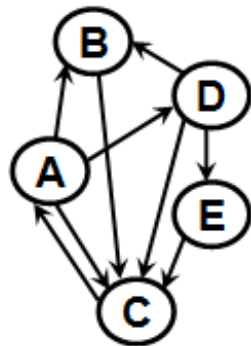
Evans, Rashad



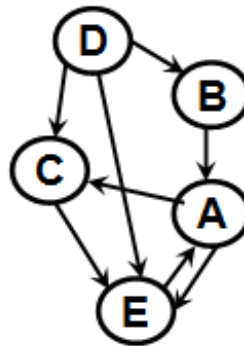
Fiesha, Temesgen



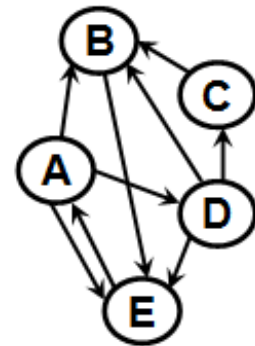
Tutika, Raj



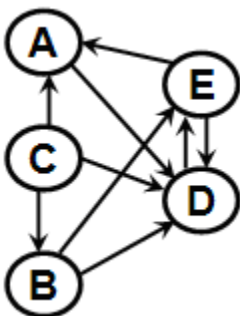
Whitfield, Nicholas



Faris, Amanuel



Ramos, Ciji



Sarker, Md Imran