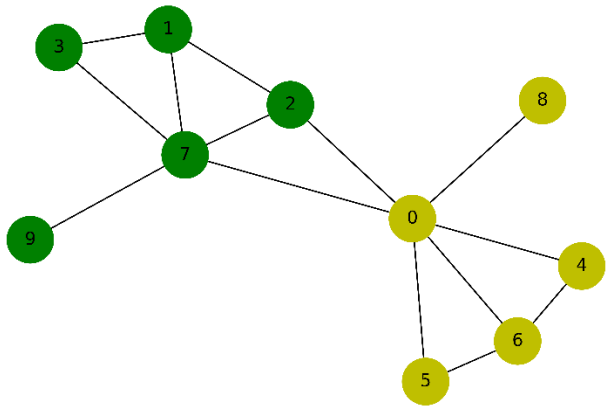
COSC 710 - Assignment 01

Show your work

Submission: Include all documents (written answers and source code) in a folder named *"Last_First_HWXX"* where XX is the assignment ID (e.g., *Smith_David_01*). Zip that folder and submit it to Blackboard. Group work is allowed (max 2 students/group). Submit once for each group

Written questions

1. For Graph 1, find
   A. Three nodes with highest degree, betweenness, and closeness, respectively. Do not use software.
   B. Who is/are the connector(s)/hub(s) in the networks, who have control over what flows in the network, and who have the best visibility of what happening in the network?
   C. The density and cohesion of the entire graph. Which subgraphs have the highest density?



Graph 1

Programming questions

2. Write a program to sort nodes in the network by the following centralities, respectively: degree, betweenness, closeness, and clustering coefficient. Input: A text file containing the adjacency list of an undirected graph. Output: Four descending sorted lists of nodes regarding each measure.
3. Download datasets Zachary's karate club (https://gephi.org/datasets/karate.gml.zip) and the The Marvel Social Network (https://gephi.org/datasets/hero-social-network.gephi) and analyze their centralities using your written program in Q2. Who are the top users in your lists? ***Note: You will need to convert gml and gephi formats to adjacency list.***
4. Choose at least two software/tools among SocNetV, Pajek, Gephi to visualize the network given in Graph 1. Include the pictures of your visualization. Use the chosen software to analyze the centralities in Q1. Do the tools/software return the same values?
5. Analyze the networks in Q3 using either SocNetV, Pajek, Gephi and reports your finding. Compare the results to yours in Q3.