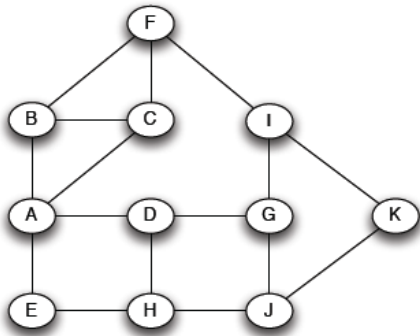# CSCD 430/530 Homework 4 (30 points)

Question 1 (7 points): Exercise 10.1.1 on Page 360.

(a) (1 point)

(b) (2 points)

(c) (4 points)

Question 2 (6 points): Use the Girvan-Newman approach to find the betweenness of each edge using Node A as the starting node.

Question 3 (7 points): Exercise 10.3.1 on Page 373.

(a) s=1 and t=3 (2 points)

(b) s=2 and t=2 (3 points)

(c) s=2 and t=3 (2 points)

Question 4 (10 points): Exercise 10.4.1 on Page 380

(1) Construct the Laplacian matrix for the given graph. (3 point)

(2) For the Laplacian matrix constructed in (1), find the second-smallest eigenvalue and its eigenvector. What partition of the nodes does it suggest? You may use Python numpy.linalg.eig() to answer this question. Make sure that you understand the output of eigenvalues and eigenvectors from Python (5 points).

(3) If we further use the third smallest eigenvalue and eigenvector to partition the nodes, what partition of the nodes does it suggest? (2 points)