DAT600: Algorithm Theory
Assignment - 6: Advanced Graph Algorithms

Submission Deadline:	

Problem-1: Connected Components (based on Lecture-19)

Find the connected components of the graph shown in the Figure-1 below, using:
1a. The iterative method that involves the power series of the adjacency matrices, and
1b. The quicker Rader's method that involves the D matrix.

By introducing just one more arc (connection) between two nodes, we can unify all the nodes into one connected components.
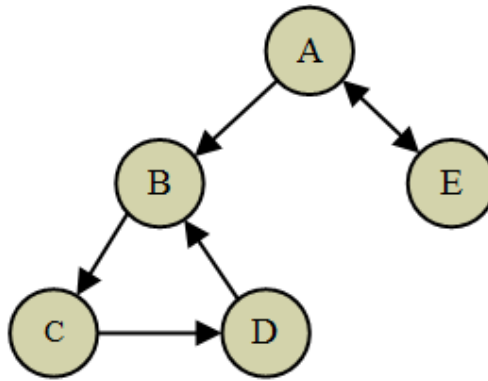1c. Name such a connection (there are several options).

Figure-1: A graph of five nodes 'A'-'E'

Problem-2: Graph Clustering (based on Lecture-21)

2a. Find the clusters of the graph shown in the Figure-1.
2b. Introduce the arc D->E into the graph, and explain the changes in the number of clusters.

Programming project: The MATLAB code provided for clustering does not realize the factor p, for preventing large clusters pulling the other nodes.
2c. Implement p in this code, and see how cluster changes when p is varied from 0 to 1. Could you explain the changes?

Problem-3: Network Centrality (based on Lecture-20)

3a. Find the network centrality measures (Degree, Betweenness, and Closeness) for the nodes of the graph in the Figure-1.
3b. How do these values change if the graph is an undirected graph.