CS 315: Algorithm Design and Analysis	Spring 2013

Homework 3

Assigned: Feb. 12, 2013   *Due: Writing part on Feb. 21, 2013*

1. (10' each) Exercises from the textbook — Problems 3.1, 3.2, 3.3.

2. (40') Given a directed graph $G = (V, E)$, implement an algorithm to determine whether it is a directed acyclic graph (DAG) and if yes, give a vaild linearization of the graph. The complexity of the algorithm should be $O(|E| + |V|)$.

   Your program should print out whether the graph is a DAG. If not, the program should print out the back edge it finds. If yes, the program should print out the valid linearization of the graph.

   The graph will be given in a text file. We make several assumptions to simplify the implementation. A graph containing n vertexes uses first n capital letters in the alphabet as the names of these vertexes. The file for a graph with n vertexes contains n lines, one for each vertex. Each line starts with the name of the vertex, followed by the edges connected to that vertex, where each edge is represented by the name of the other vertex. The names of vertexes are separated by one or more spaces. For example, the graph in Figure 3.8 can be represented as

   ```
   A  C
   B  A  D
   C E F
   D  C
   E
   F
   ```

   Your program will run as `your_program_name file_name`, where `file_name` is the name of the text file containing the graph.

   You should submit your program through the CS Web Portal at `https://www.cs.uky.edu/csportal`

   Note that the programming part is due on **Feb. 24, 2013**.