CSE 421: Introduction to Algorithms
Assignment #2
January 16, 2002
Due: Wednesday, January 23

Reading Assignment: Kleinberg and Tardos, chapters 2 and 3.

Problems

1. Kleinberg and Tardos, page 52, problem 2.
2. Consider depth-first-search on a *directed* graph $G = (V, E)$, starting from node s. Let $T = (V_T, E_T)$ be the resulting depth-first-search tree.
   (a) Characterize the set of nodes in V_T.
   (b) The edges visited during the depth-first search can be categorized into four categories:
   - tree edges: edges in E_T;
   - forward edges: edges from a node in V_T to a descendent (that is not a child) in V_T;
   - back edges: edges from a node in V_T to an ancestor in V_T;
   - cross edges: edges between nodes in V_T that are unrelated in T.

   Write pseudo-code for $DFS(s)$ that prints out for each edge visited whether or not it is a tree edge, a forward edge, a back edge or a cross edge.
3. Find a necessary and sufficient condition for a directed acyclic graph to have a unique topological order.
4. **Extra Credit:** Kleinberg and Tardos, page 52, problem 3
5. **Extra Credit:** Feedback on chapter 2 in book. Please submit this by email to both Erik and Anna.