**CMPS 101**
**Spring 2008**
**Homework Assignment 7**

1. (1 Point)  p.547: 22.3-2
   Show how depth-first search works on the graph of Figure 22.6 (p.548).  Assume that the **for** loop of lines 5-7 of the DFS procedure considers the vertices in alphabetical order, and assume that each adjacency list is ordered alphabetically.  Show the discover and finishing times for each vertex, and show the classification of each edge.

2. (1 Point)  p.547: 22.3-9
   Modify the pseudocode for depth-first search so that it prints out every edge in the directed graph together with its type.

3. (1 Point)  p.547: 22.3-11
   Show that a depth-first search of an undirected graph $G$ can be used to identify the connected components of $G$, and that the depth-first forest contains as many trees as $G$ has connected components.  More precisely, show how to modify depth-first search so that each vertex $v$ is assigned an integer label $cc[v]$ between 1 and $k$, where $k$ is the number of connected components of $G$, such that $cc[u] = cc[v]$ if and only if $u$ and $v$ are in the same connected component.

4. (1 Point)  p.551: 22.4-1
   Show the ordering of vertices produced by TOPOLOGICAL-SORT when it is run on the dag of Figure 22.8, under the assumption of Exercise 22.3-2.

5. (1 Point)  p.557: 22.5-2
   Show how the procedure STRONGLY-CONNECTED-COMPONENTS works on the graph of Figure 22.6.  Specifically, show the finishing times computed in line 1 and the forest produced in line 3.  Assume that the loop of lines 5-7 of DFS considers vertices in alphabetical order and that the adjacency lists are in alphabetical order.