CS577: Homework 6 Due date: Monday, Oct 17, 2011

Please note that your reading assignment is an integral part of your homework.

1. 3.1
2. 3.2 do the first graph part (a).
3. 3.3.

4. Write the pseudocode of the alternative algorithm I outlined in class for finding the topological sort of a directed acyclic graph (DAG).

Your algorithm should take as input the adjacency lists (for each node $u$, a linked list of its forward neighbors $v$, i.e., the pair $(u, v)$ is a directed edge), and either detect the graph is not a DAG, or find a topological sort of all the vertices.

Your algorithm should run in the following way: First detect all vertices of in-degree 0. These are the source nodes. Then using a queue to keep a list of vertices that can be output next in the topological sort, and whenever removing a node $u$ from the queue, update the in-degrees of all $v$ such that $(u, v)$ is a directed edge. Then update the queue accordingly. You should prove your algorithm works, and show that it runs in linear time $O(|V| + |E|)$.

Run your algorithm on the example in 3.3.

5. 3.4. Do only the second graph labeled (ii).

6. 3.5.

7. 3.7. part (a).

8. 3.16.

9. extra credit 3.28.

Note: You should get on to your homework as soon as possible. Don’t delay to the last minute.