Fall 2006 **CMSC 451: Homework 7** William Gasarch

Due Wedensday Nov 1, at Beginning of class

(NOTE- HW is due on Wedensday even though given out on Friday, but its short.)

1. (0 points). Write your name clearly. Staple your HW. READ Chap 4 and the notes on BFS and DFS we will be giving out and posting on the website. REVIEW notes and text for midterm.

2. (40 points) Show how to solve the following problem in $O(V+E)$ time: Given a graph G that is a DAG (directed Acyclic Graph) and two vertices s and t, determine the number of paths from s to t.

3. (40 points) You are given n tasks to be performed. The ith task takes t_i units of time to complete. You are also given a set a DAG on on the n tasks which constrains the order they must be done in. For example, if $(4,8)$ is an edge, then you must do task 4 before task 8. Assume the graph has m edges. Present an $O(V+E)$ time algorithm which, given the times t_i and the graph G, determines the min time needed to complete all the tasks. (HINT: Use a DFS but also store additional information.)

4. (20 points) Show that if the DFS tree of an undirected graph has k back edges then there are at least k cycles.