CSci 421
Introduction to Algorithms

Homework Assignment 2
Due: Wednesday, 21 Jan 2004

Winter 2004
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Reading Assignment: Chapter 5.

Homework:

1. Show that if $f(n) = o(g(n))$ then $f(n) = O(g(n))$ but not $f(n) = \Omega(g(n))$ and not $f(n) = \Theta(g(n))$.

2. 3.5. Where possible, show $f(n) = o(g(n))$ or *vice versa*. Justify your answers.

3. Show $\sum_{i=2}^{n} i/\log_2 i = \Theta(n^2/\log n)$.

4. 5.3.

5. A *topological ordering* of a directed acyclic graph $G = (V, E)$ is a numbering of its vertices, i.e. a function $t : V \rightarrow \{1, \ldots, |V|\}$, with the property that $t(u) < t(v)$ for all edges $(u, v) \in E$. Give an algorithm that will construct such a numbering for an arbitrary directed acyclic graph. Try to make your description of the algorithm reflect the "inductive approach" to algorithm design stressed in chapter 5. Analyze the running time of your algorithm. (Time $O(|V| + |E|)$ is possible.)