

## CMSC 451: Homework 4, Spring 2005

Due at the beginning of class on **April 12, 2005**.

Warning: some of the problems require thought - do not wait until the last day to start working on them!

If you cannot come up with algorithms that run in the required time, then provide (correct) slower algorithms for partial credit. Write your answers using *pseudo-code* in the same style as the textbook. These make the algorithm description precise, and easy to read (as opposed to code in C or some other language).

1. Recall that an *independent set* in an undirected graph  $G$  is a subset  $S$  of the vertices, such that no two elements of  $S$  are neighbors in  $G$ . We are given an undirected *tree*  $T$ ; each vertex of  $T$  also has a given non-negative weight. Design an efficient (polynomial-time) algorithm to find an independent set of maximum total weight in  $T$ . Prove correctness, and analyze the running time of your algorithm.
2. Problem 2 in Section 6.12, pages 295-296 of the textbook.
3. Problem 3 in Section 6.12, pages 296-297 of the textbook.
4. Problem 7 in Section 6.12, page 300 of the textbook.