Homework 3

To be finished individually. Due on Thursday, Feb 3, 2011. Submit by the end of class.

1. *(10 points) Consider the following weighted version of the "triangle-free" problem. Given an undirected graph with nonnegative weights on the edges, the problem is to remove a set of edges with minimum total weight such that the residual graph contains no triangle. Give a 3 approximation algorithm that runs in polynomial time.*

2. *(15 points) Consider the following maximum covering problem. Given a graph G and a given number k, find a subset of k vertices that touches the maximum number of edges. Let $opt(G, k)$ be the optimal number of edges touched in G by a set of at most k vertices. Your task, however, is not to give solutions to this this problem. Your task is to first design an integer programming formulation for the problem, and then find a randomized rounding procedure for the corresponding linear programming relaxation, such that for given G and k, it identifies a set of at most $2k$ vertices that touches at least $c \cdot opt(G, k)$ edges, for some positive constant c.*