Due at the start of class Thursday, October 13, 2011.

**Problem 1.** Do Exercise 3 on pages 189-190 of Kleinberg and Tardos. But use “our favorite method” for the proof.

**Problem 2.**

(a) Show that Prim’s algorithm is correct using “our favorite method”.

(b) Show that Prim’s algorithm is correct using mathematical induction.

**Warning:** The two solutions should look very similar to each other.

**Problem 3.** Suppose we are given a graph $G$ (connected, undirected) with costs on the edges (all costs > 0). Now we construct a new graph $G'$, which is the same as $G$, except for the costs. The cost of an edge $e$ is defined to be $1/c_e$ where $c_e$ is the cost of $e$ in $G$.

1. Is the Minimum cost spanning tree in $G$, the Maximum cost spanning tree in $G'$? Prove or disprove.

2. Suppose that $P$ is the shortest path from $s$ to $v$ in $G$. Is $P$ the longest simple path from $s$ to $v$ in $G'$? Prove, or disprove.

**Problem 4.** Do Exercise 16 on pages 196-197 of Kleinberg and Tardos.