HW #4

ELEN E4710 - Intro to Network Engineering — Due 3/7/2002
Spring 2002 — Prof. Rubenstein

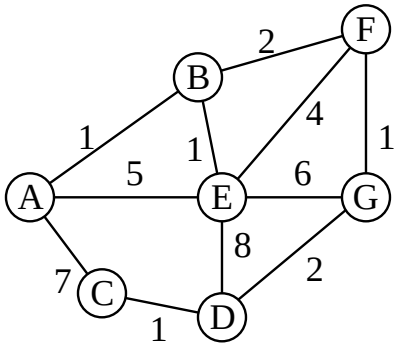
Homework must be turned in at the beginning of class on the due date indicated above. CVN students have one additional day. Late assignments will not be accepted.

1. How many different spanning trees (that connect all nodes) can be formed on top of an n-node graph that has an edge between every pair of nodes. Explain how you reached your answer.

2. Let G be a graph where each edge has 2 weight functions, w and v, where $v(e) = w(e) + 1, w(e) > 0$ for each edge $e \in G$.

   (a) If tree T is a minimum spanning tree using weight function w, is it also a minimum spanning tree using weight function v? Explain why this is true or give a counterexample.

   (b) If tree T is a shortest path tree using weight function w, is it also a shortest path tree using weight function v? Explain why this is true or give a counterexample.



3. Compute an MST for the above graph using either algorithm covered in class.

4. Compute a shortest path tree rooted at node A.

   (a) using Dijkstra's algorithm.

   (b) using the Bellman-Ford algorithm (include the information about the predecessor node).

   (c) Assume that after the Bellman-Ford algorithm completes (i.e., no further changes are made to the tree), the weight of edge (E, D) changes to 1. Continue the algorithm to find the new shortest path.

   (d) Assume that after the Bellman-Ford algorithm completes for a second time, edge (F, G) changes its weight to 4. Continue the algorithm once more to find the new shortest path.