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Theory of Network Communication

Fall 2003

Assignment 1

Problem 1 (4 points)**:**
Show that the modified Bellman-Ford algorithm together with the rules of deciding whether an edge belongs to the MST or not indeed creates an MST. Do this in two steps:

(a) Show that the modified Bellman-Ford algorithm produces final values for $D_{u,v}(w)$ with $\min_v D_{u,v}(w) = \gamma(u,w)$. (2 points)

(b) Show that under the assumption that $\min_v D_{u,v}(w) = \gamma(u,w)$, the edge selection rules indeed create an MST. (2 points)

Problem 2 (6 points)**:**
Implement the (original) Bellman-Ford algorithm in the Spheres simulation environment using the following graph.

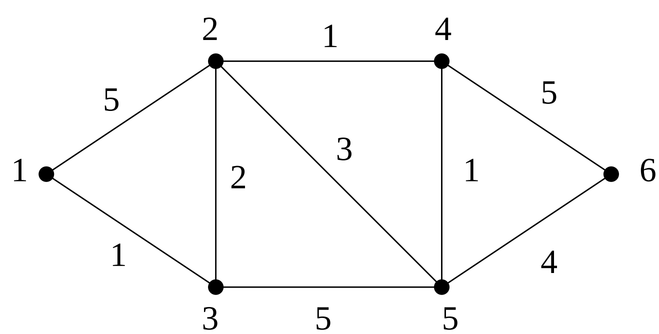

Figure 1: An example graph for the Bellman-Ford algorithm. The numbers at the nodes represent node numbers, and the numbers at the edges represent edge costs.

Submit a printout with the program (5 points) and all final $\min_v D_{u,v}(w)$ values (1 point) for all u and w.