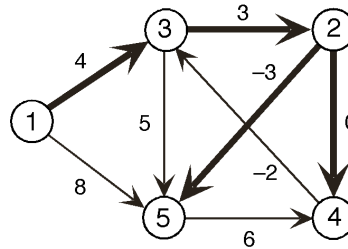


MthSc 440/640 Problem Set #9

Due 4/20/12

1. In the network shown below, let T be the tree defined by the arcs in bold.



Answer all parts independently of one another.

(a) Directly *verify* that T is a shortest path tree with origin node 1; clearly show your calculations. [Do not simply solve this from scratch as a shortest path problem by some standard algorithm.]

(b) Suppose that all arc costs remain the same except the cost c_{32} of arc $(3,2)$. Determine the largest range on c_{32} so that T remains a shortest path tree from node 1. Clearly indicate your reasoning.

(c) Suppose that the cost on arc $(2,5)$ increases to 4 and all other arcs retain their original cost. Using the same tree T defined above, compute the new node labels and use these to verify whether T is a shortest path tree from node 1. If not, continue the label-correcting algorithm to find the new shortest path tree. [At each step, show the new tree and new node labels. Break any ties by selecting arcs with the most negative reduced cost.]