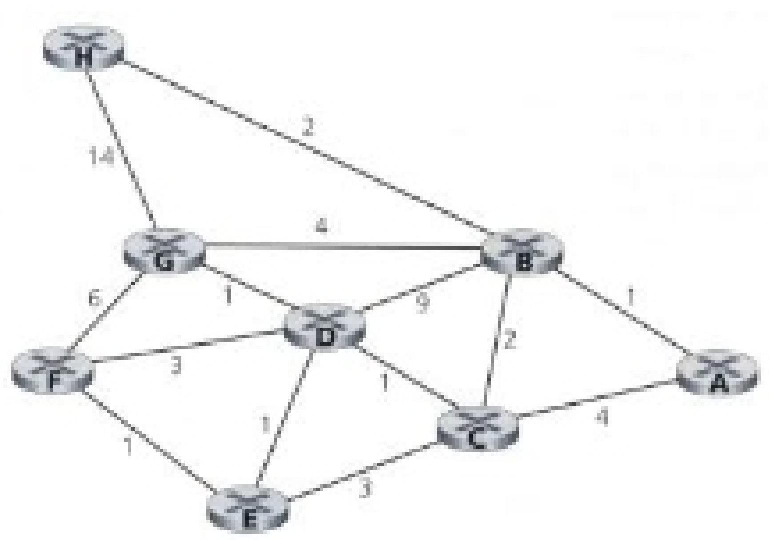

Figure 1: Network with edge weights

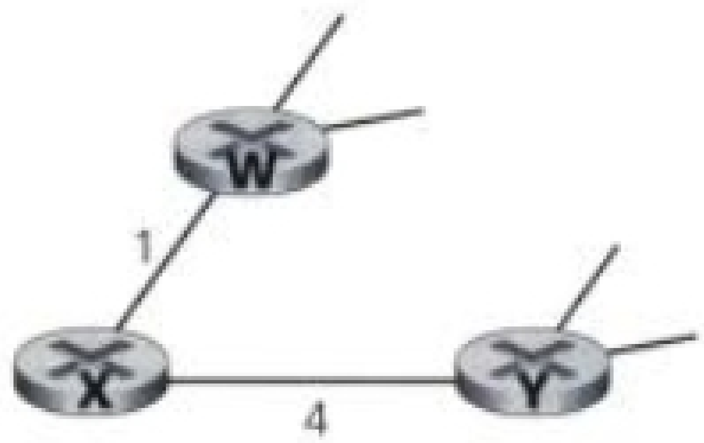

Figure 2: Fragment of network.

Problem 1

In this problem we'll explore the impact of NATs on P2P applications. Suppose a peer with username Alice discovers through querying that a peer with username Bob has a file it wants to download. Also suppose that Bob and Alice are both behind a NAT. Is it possible to devise a technique that will allow Alice to establish a TCP connection with Bob without application-specific NAT configuration? Why or why not?

Problem 2

If you have a network that looks like Figure 1 and you use the link weights shown, use Dijkstra's shortest-path algorithm to compute the shortest path from F to all network nodes. Show how the algorithm works by computing a table like Table 4.3 (4th:page 373, 5th: page 379) in your book.

Problem 3

Using the network in Figure 2, x has only 2 attached neighbors, w and y. w has a minimum-cost path to destination u (not shown) of 5, and y has a minimum-cost path to u of 6. The complete paths from w and y to u (and between w and y) are not shown. All link costs in the network have strictly positive integer values.

a. Find x's distance vector for destinations w, y, and u.

b. Find a case of link-cost change (if any) for either $c(x, w)$ or $c(x, y)$ such that x will inform its neighbors of a new minimum-cost path to u as a result of executing the distance vector algorithm.

Problem 3 continued on next page...

c. Find a case of link-cost change (if any) for either $c(x, w)$ or $c(x, y)$ such that x will *not* inform its neighbors of a new minimum-cost path to u as a result of executing the distance vector algorithm.