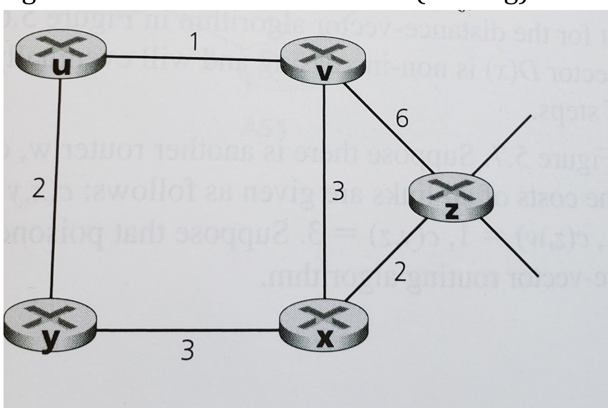
CS 3251 – Spring 2019 - Homework 2
Assigned: February 21, 2019, Due: February 28, 2019

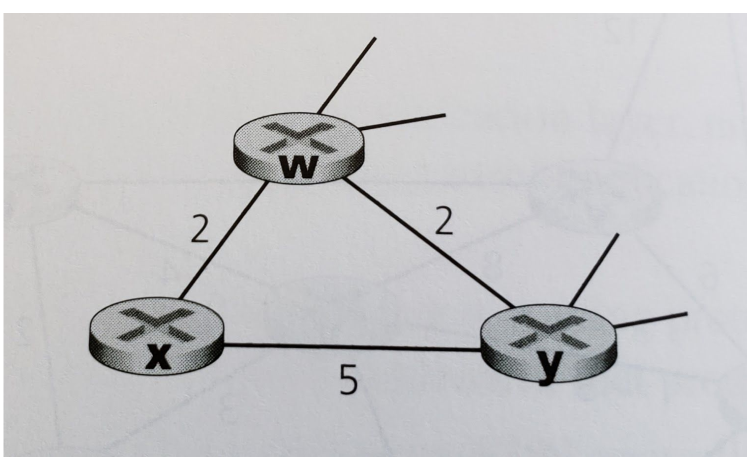
You must show your work. Answers without work will not be given credit.

1. Chapter 4, P13 from K&R 7th edition: Use the whois service at the American Registry for Internet Numbers (www.arin.net/whois) to determine the IP address blocks for three universities. Can the whois services be used to determine with certainty the geographical location of a specific IP address? Use www.maxmind.com to determine the locations of the web servers at each of these universities.

2. Chapter 5, P5 from K&R 7th edition: Consider the network shown below, and assume that each node initially knows the costs to each of its neighbors. Consider the distance-vector algorithm and show the distance (routing) table entries at node z.



3. Chapter 5, P7 from K&R 7th edition: Consider the network fragment shown below. x has only two 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. Give x's distance vector for destinations w, y, and u.

b. Give a link-cost change 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.

c. Give a link-cost change 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.

4. Chapter 5, P11 from K&R 7th edition: Consider Figure 5.7. Suppose there is another router w, connected to router y and z. The costs of all links are given as follows: c(x,y) = 4, c(x,z) = 50, c(y,w) = 1, c(z,w) = 1, c(y,z) = 3. Suppose that poison reverse is used in the distance-vector routing algorithm.

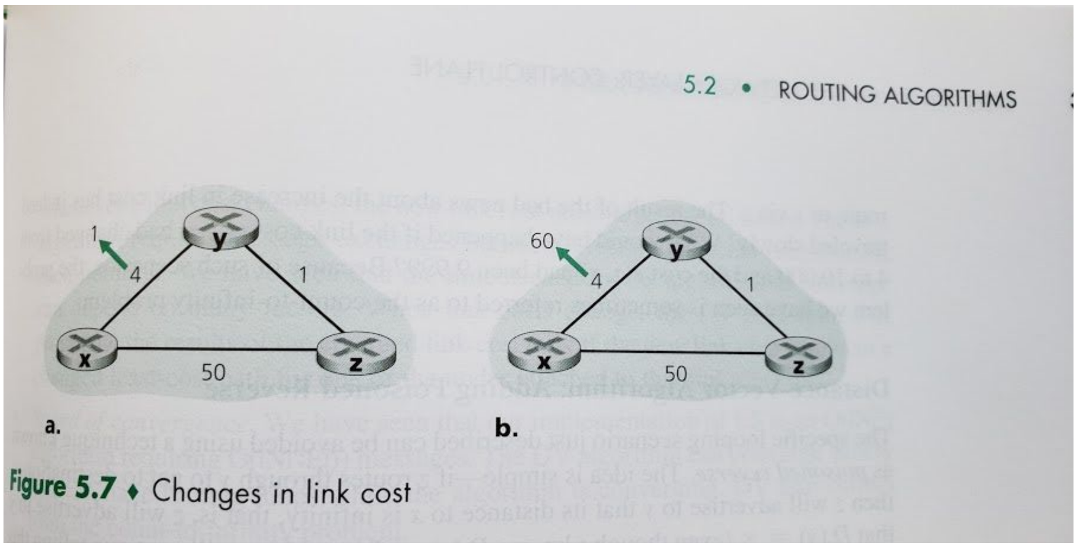
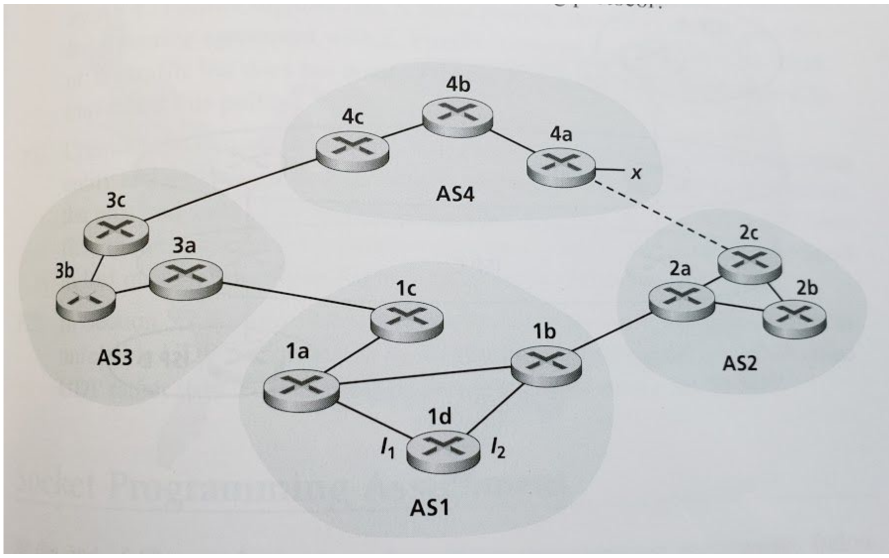


Figure 5.7 ♦ Changes in link cost

a. When the distance vector routing is stabilized, router w, y, and z inform their distances to x to each other. What distance values do they tell each other?

b. Now suppose that the link cost between x and y increases to 60. Will there be a count-to-infinity problem even if poisoned reverse is used? Why or why not? If there is a count-to-infinity problem, then how many iterations are needed for the distance-vector routing to reach a stable state again? Justify your answer.

5. Chapter 5, P15 from K&R 7th edition. Refer to the figure in P14 and assume the link from AS2 to AS4 is initially *not* present. Once router 1d learns about x it will put an entry (x, I) in its forwarding table.



a. Will I be equal to I1 or I2 for this entry? Explain in one sentence.

b. Now suppose that there is a physical link between AS2 and AS4, shown by the dotted line. Suppose router 1d learns that x is accessible via AS2 as well as via AS3. Will I be set to I1 or I2? Explain in one sentence.

c. Now suppose there is another AS, called AS5, that lies on the path between AS2 and AS4 (not shown in the diagram). Suppose router 1d learns that x is accessible via AS2 AS5 AS4 as well as via AS3 AS4. Will I be set to I1 or I2? Explain in one sentence.

6. Suppose you wanted to peer (connect at the AS level) with Google. Start here to learn about Google's peering policies: https://peering.google.com/#/options/peering. Then follow the pointer to peeringdb.com to figure out where you could peer with them if you want to do so in Atlanta. Does it matter if you want public or private peering? Explain. How many ASes does Google control? Can you peer with all of them?