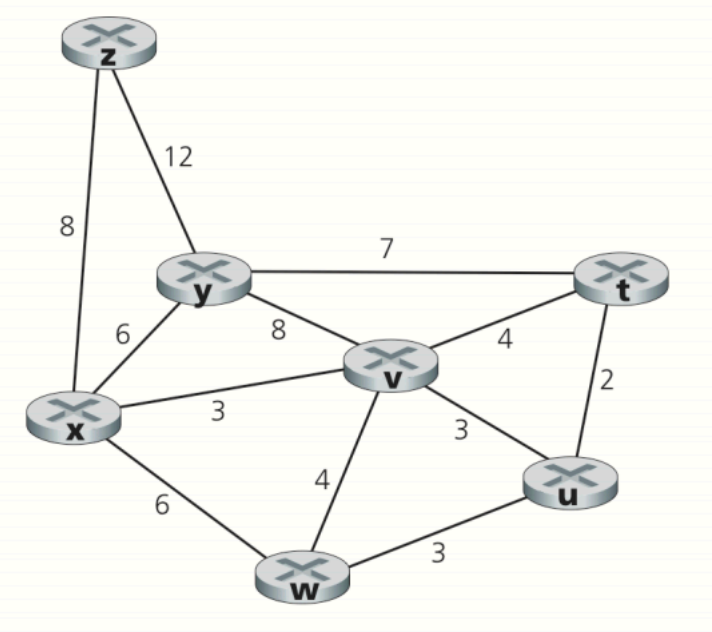
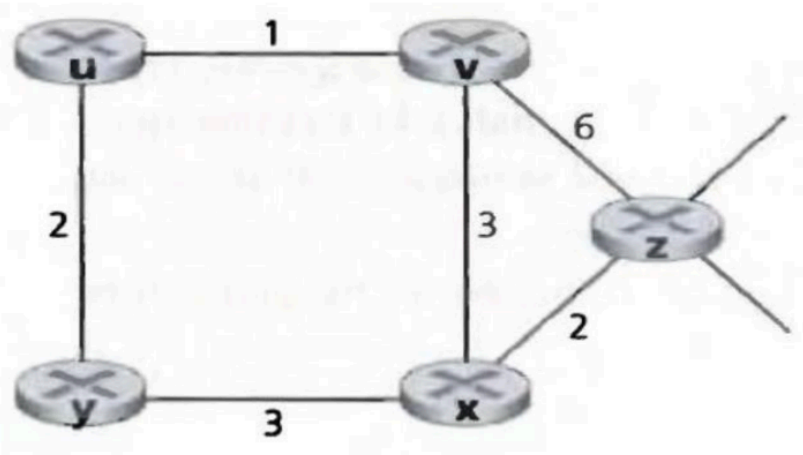
Homework Assignment 4

1. (2pt) Compare and contrast link-state and distance-vector routing algorithms.

2. (3pt) Consider the following network. With the indicated link costs, use Dijkstra's shortest-path algorithm to compute the shortest path from x to all network nodes. Show the algorithm by computing a table similar to Slide 15 in Chapter 5.



3. (5pt) 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 table entries at node z. (Show the distance table entries in each step)

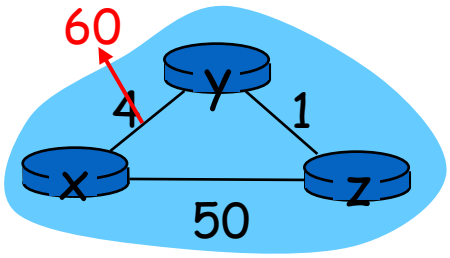


4. (2pt) Suppose we have the forwarding tables shown in the following table for nodes A and F, in a network where all links have cost 1. Give a diagram of the smallest network consistent with these tables.

A		
Node	Cost	Nexthop
B	1	B
C	2	B
D	1	D
E	2	B
F	3	D

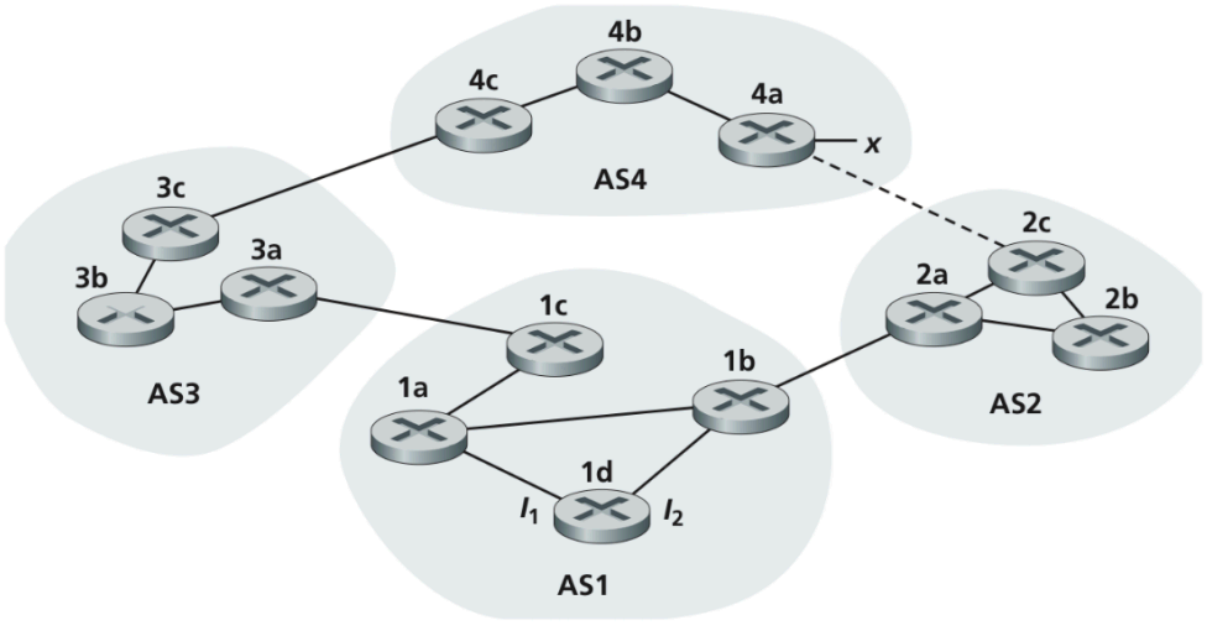
F		
Node	Cost	Nexthop
A	3	E
B	2	C
C	1	C
D	2	E
E	1	E

5. (3pt) Consider the network below. When the link cost c(x, y) increases from 4 to 60. Explain why it takes 44 iterations for the algorithm to stabilize. (Hint: show the distance table entries in each iteration)

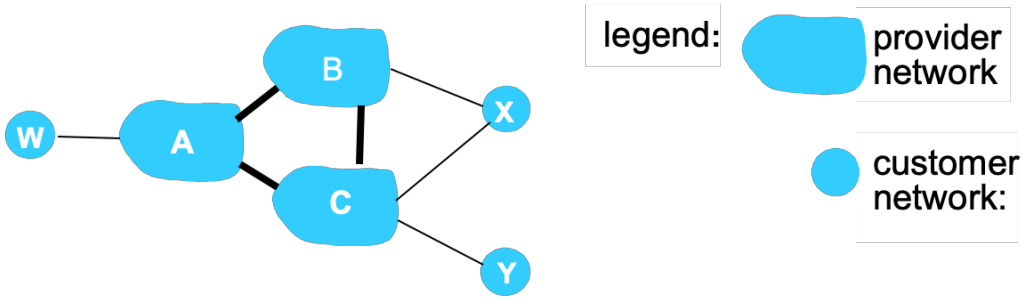


6. (4pt) Consider the network shown below. Suppose AS3 and AS2 are running OSPF for their intra-AS routing protocol. Suppose AS1 and AS4 are running RIP for their intra-AS routing protocol. Suppose eBGP and iBGP are used for the inter-AS routing protocol. Initially suppose there is no physical link between AS2 and AS4.

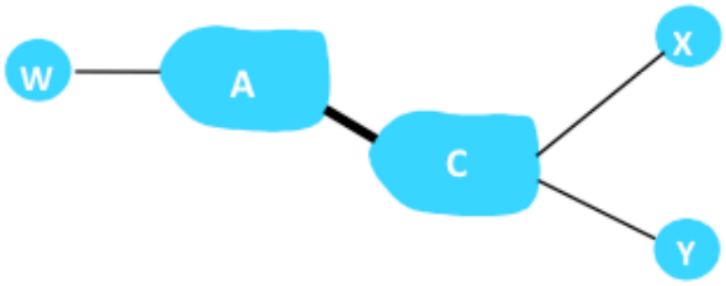
    a. Router 3c learns about prefix x from which routing protocol: OSPF, RIP, eBGP, or iBGP?
    b. Router 3a learns about prefix x from which routing protocol?
    c. Router 1c learns about x from which routing protocol?
    d. Router 1d learns about x from which routing protocol?



7. (4pt) In the figure below, X, Y and Z are access ISPs and A, B and C are backbone provider networks. Suppose an ISP only wants to route traffic to/from its customer networks (does not want to carry transit traffic between other ISPs). Another BGP policy X wants to enforce is that X does not want to route from B to C via X.



Following is the topology view at Y. Draw the topology views of W and X.


W
A
C
X
Y