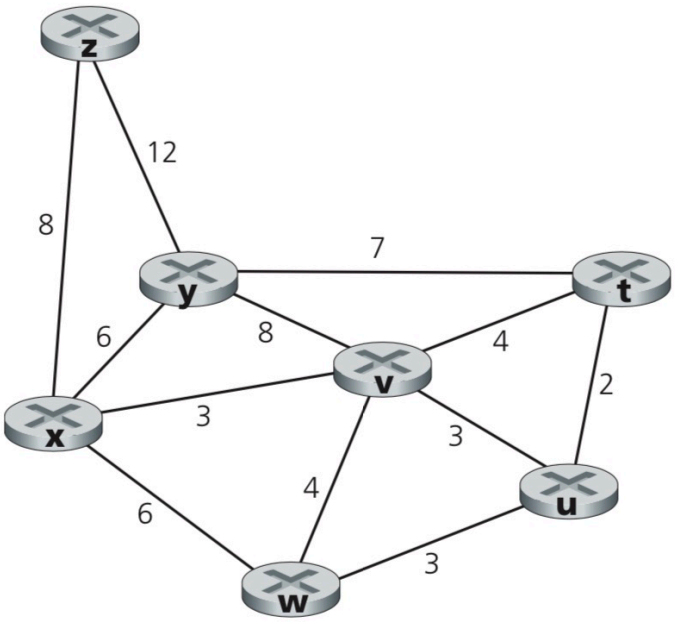
Exercise

P3

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 how the algorithm works by computing a table similar to Table 5.1.

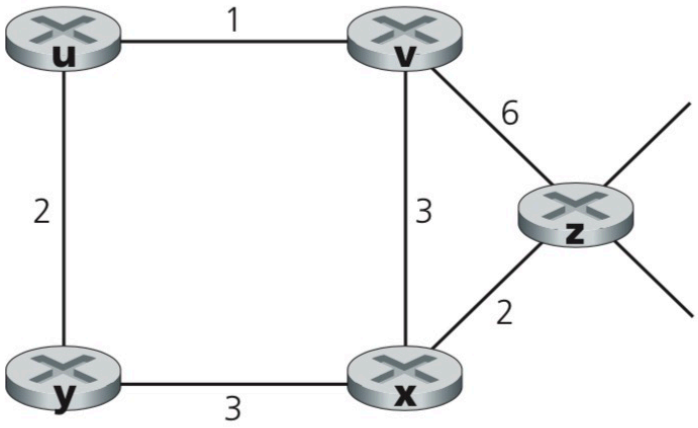


Answer

Step	N'	D(y),p(y)	D(z),p(z)	D(u),p(u)	D(v),p(v)	D(w),p(w)	D(t),p(t)
0	x	6,x	8,x	∞,x	3,x	6,x	∞,x
1	xv	6,x	8,x	6,v	3,x	6,x	7,v
2	xvy	6,x	8,x	6,v	3,x	6,x	7,v
3	xvyu	6,x	8,x	6,v	3,x	6,x	7,v
4	xvyuw	6,x	8,x	6,v	3,x	6,x	7,v
5	xvyuwt	6,x	8,x	6,v	3,x	6,x	7,v
6	xvyuwtz	6,x	8,x	6,v	3,x	6,x	7,v

P5

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*.



Answer

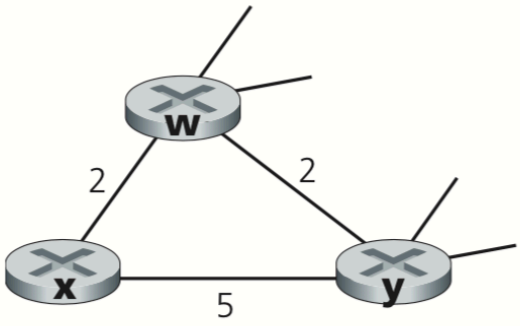
	u	v	x	y	z
v	∞	∞	∞	∞	∞
x	∞	∞	∞	∞	∞
z	∞	6	2	∞	0

	u	v	x	y	z
v	1	0	3	∞	6
x	∞	3	0	3	2
z	7	5	2	5	0

	u	v	x	y	z
v	1	0	3	3	5
x	4	3	0	3	2
z	6	5	2	5	0

P7

Consider the network fragment shown below. *x* has only two attached neigh- bors, *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.

Answer

a. Dx(w)=2, Dx(y)=4, Dx(u)=7

b. If c(x,w) changes. If c(x,w)>6, the least cost path will pass through y and cost 11. x will inform its neighbours. If c(x,w)<2, the least cost path will be the same one but cost 5+c(x,w). x will inform its neighbours as well.

If c(x,y) changes. If c(x,y)<1, the lesat cost path will pass through y and cost 6+c(x,w). x will inform its neighbours.

c. If c(x,y) changes. If c(x,y)>=1, x won't inform its neighbours.

If c(x,w) changes. If c(x,w)>=2 and c(x,w)<6, x won't inform its neighbours.

P12

Describe how to detect a loop in BGP.

Answer

If a BGP peers receive a BGP message that the AS path contains its own AS number, then using that loop will result in a loop.

P14

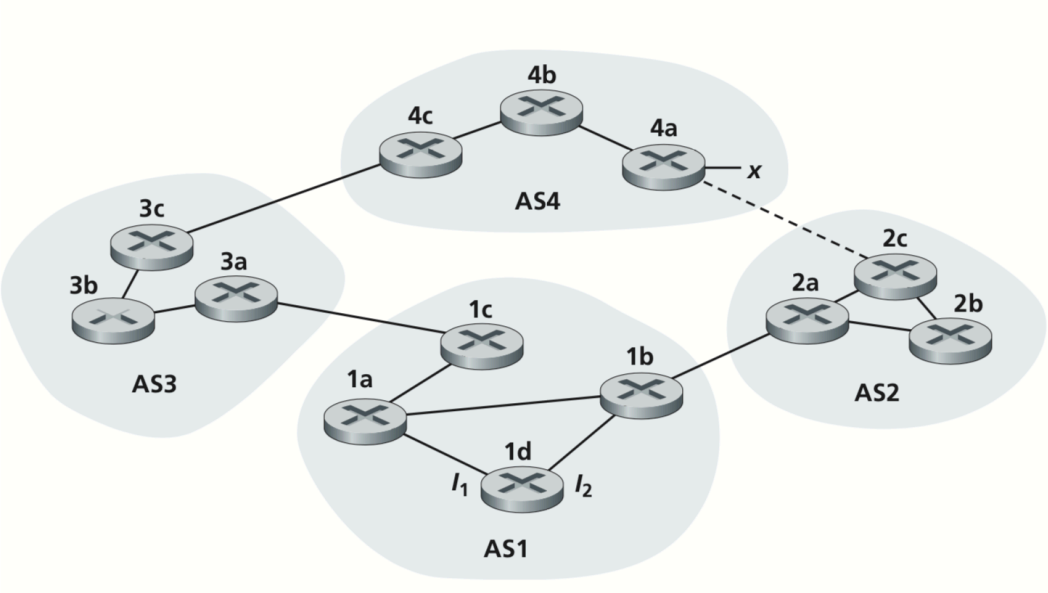
Consider the network shown below. Suppose AS3 and AS2 are running OSPF for their intra-AS routing protocol. Suppose AS1 and AS4 are running RIP for their intra-AS routing protocol. Suppose eBGP and iBGP are used for the inter-AS routing protocol. Initially suppose there is *no* physical link between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

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

b. Router 3a learns about *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?



Answer

a. eBGP

b. iBGP

c. eBGP

d. iBGP