P3.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Step | N’ | D(z), p(z) | D(y), p(y) | D(w), p(w) | D(v), p(v) | D(u), p(u) | D(t), p(t) |
| 0 | x | 8,x | 6,x | 6,x | 3,x |  |  |
| 1 | xv | 8,x | 6,x | 6,x | **3,x** | 6,v | 7,v |
| 2 | xvu | 8,x | 6,x | 6,x | 3,x | **6,v** | 7,v |
| 3 | xvuw | 8,x | 6,x | **6,x** | 3,x | 6,v | 7,v |
| 4 | xvuwy | 8,x | **6,x** | 6,x | 3,x | 6,v | 7,v |
| 5 | xvuwyt | 8,x | 6,x | 6,x | 3,x | 6,v | **7,v** |
| 6 | xvuwytz | **8,x** | 6,x | 6,x | 3,x | 6,v | 7,v |

The shortest path from x including cost:

t: xvt = 7, u: xvu = 6, v: xv = 3, w: xw = 6, y: xy = 6, z: xz = 8

P5.

Step 1:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Destination → | Source↓ | u | v | x | y | z |
| V |  |  |  |  |  |
| X |  |  |  |  |  |
| Z |  | 6 | 2 |  | 0 |

Step 2:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Destination → | Source↓ | u | v | x | y | z |
| V | 1 | 0 | 3 |  | 6 |
| X |  | 3 | 0 | 3 | 2 |
| Z | 7 | 5 | 2 | 5 | 0 |

Step 3:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Destination → | Source↓ | u | v | x | y | z |
| V | 1 | 0 | 3 | 3 | 5 |
| X | 4 | 3 | 0 | 3 | 2 |
| Z | 6 | 5 | 2 | 5 | 0 |

P7. A. Vx(w) = 2 Vx(y) = 2 Vx(u) = .

B. If c(x, y) becomes larger or smaller, the least cost path from x to u will still have a cost of at least 7. Therefore, a change in c(x, y) will not cause x to inform its neighbors. If c(x, w) = **ε <= 1, then the least cost path to u continues to pass through w and its cost changes to 5 + ε, causing x to have to inform its neighbors of this new cost. If c(x, w) = δ > 6, then the least cost path to u now passes through y and has a cost of 11, causing x to have to inform its neighbors.**

**C. The distance-vector algorithm does not cause x to inform its neighbors of a new minimum-cost path to u.**

**P14. A. eBGP. eBGP runs between routers in different AS’s. iBGP runs between routers in the same AS. Router 3c learns about x from eBGP.**

**B. iBGP. Even though router 3a is not connected directly to AS4, it’s in AS3, so iBGP is used by 3c. The remaining routers is iBGP.**

**c. iBGP. Router 1c is connected directly with AS3.**

**d. iBGP. Since AS2 is not connected physically to AS4, they have to go through AS3 to get to AS4. Only router 1c is connected to AS3 so it uses eBGP. The remaining routers use iBGP.**

**P15. A. I1 because this interface begins the least cost path from 1d towards the gateway router 1c.**

**B. I2. Both paths travel through the same amount of AS but I2 begins closest to the next hop.**

**C. I1 because I1 travels through the least amount of AS.**

P17. According to the topology shown in the diagram, X and Y are directly using C’s network. A and C directly send traffic to each other and also provide BGP information to their customer networks. BGP is the main routing protocol for their choice between ISPs, but also as the core routing protocol within large ISP networks. From Y’s point of view, the topology will provide the access to the C’s network in shared mode with X. W’s connection to A will be iBGP while Y’s connection will be eBGP.

P19. Number of provider networks is 3 (A, B, and C). Number of customer networks is 4 (W, V, X, and Y). AS A collects information only from AS B. AS V A collects information from AS B and AS C. So, the route to be advertised by A for B to reach A is AS-path AW. The path used by C to reach W is AS-path CBAW.