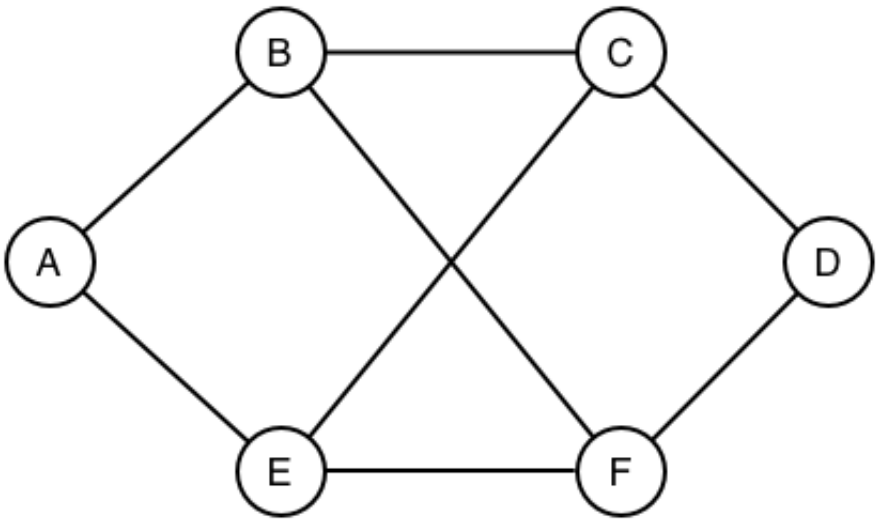
Homework 4

Warning: You have already made the maximum number of submissions. Additional submissions will not count for credit. You are welcome to try it as a learning exercise.

☐ **I, Matthew Kramer, certify that my answers here are my own work, and that I completed this in accordance with the Coursera Honor Code.**

Question 1

Consider the network given. Distance vector routing is used, and the following vectors have just come in to router C: from B: (5, 0, 8, 12, 6, 2); from D: (16, 12, 6, 0, 9, 10); and from E: (7, 6, 3, 9, 0, 4). (A routing vector gives the costs of the paths from a given node to every other node in the system. For example, the routing vector from B indicates that its distance to A is 5, its distance to B is 0, and so on.) The cost of the links from C to B, D,and E, are 6, 3, and 5, respectively.



After C updates its routing table, what is C's next hop on its route towards A, and what is the cost of the computed route?

- ○ Next hop is B, cost is 5
- ○ Next hop is B, cost is 11

- Next hop is E, cost is 7
- Next hop is E, cost is 12

Question 2

Consider the same setup as in the previous question. After C updates its routing table, what is C's next hop on its route towards F, and what is the cost of the computed route?

- Next hop is B, cost is 8
- Next hop is E, cost is 4
- Next hop is D, cost is 13
- Next hop is B, cost is 2

Question 3

Consider a network with 50 routers in which every router is connected to four other routers. Assume that costs are recorded as 8-bit numbers, and distance vectors are exchanged twice a second. What is the bandwidth consumed by the distance vector updates coming out of a node? (Note that you need to count only the traffic coming out of it and not the traffic going into it.)

- 1600 bps
- 400 Bps
- 800 bps
- 200 Bps

Question 4

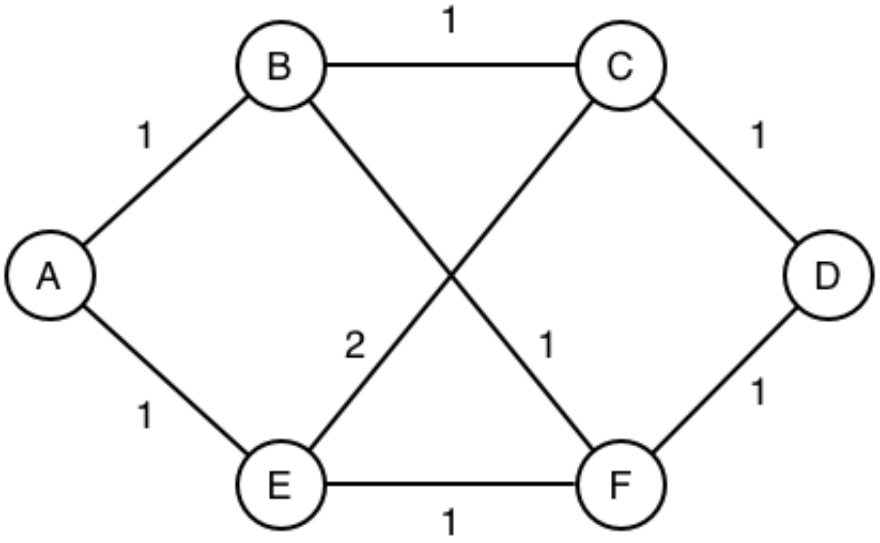
Consider a network with 50 routers in which every router is connected to four other routers. Assume that costs are recorded as 8-bit numbers, and that link state packets

have the following format: number of neighbors connected to a node (represented using 8 bits), and for each neighbor, the identity of the neighbor (represented using 8 bits) and the cost of the link to the neighbor (also represented by 8 bits). What is the size of a single link state packet?

- 40 bits
- 9 bytes
- 64 bytes
- 8 bytes

Question 5

Consider the given network. How many ECMP routes exist from D to A and what is the cost of these routes?



- 3 routes of cost 3
- 2 routes of cost 4
- 3 routes of cost 4
- 4 routes of cost 3

Question 6

Which one of the following is **not** an advantage of using link state routing protocol instead of distance vector?

- Can be used to determine multiple paths between a pair of nodes
- Quick convergence
- Message complexity for maintaining connectivity information in a stable network is low
- Avoids the count to infinity problem

Question 7

A router has just received path announcements for the following IP prefixes: 57.6.96.0/21, 57.6.104.0/21, 57.6.112.0/21, and 57.6.120.0/21. If all of them use the same outgoing line, can they be aggregated? If so, to what?

- Yes, aggregated to 57.6.112.0/19
- Yes, aggregated to 57.6.96.0/18
- No, they cannot be aggregated
- Yes, aggregated to 57.6.96.0/19

Question 8

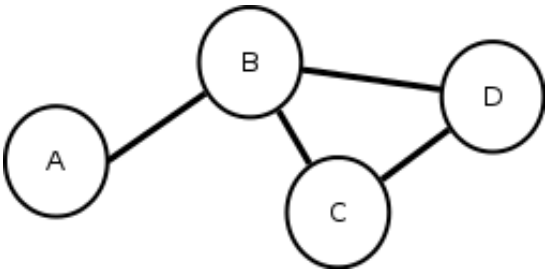
A router has computed the following paths: packets to prefix 57.6.96.0/21 are sent through line 1, packets to 57.6.104.0/21 through line 1, packets to 57.6.112.0/21 through line 2, and packets to 57.6.120.0/21 through line 1. Which one of the following is not a valid routing table configuration given these paths?

- Route to 57.6.96.0/19 through line 1, route to 57.6.112.0/20 through line 2
- Route to 57.6.96.0/19 through line 1, route to 57.6.112.0/21 through line 2

- Route to 57.6.96.0/20 through line 1, route to 57.6.112.0/21 through line 2, and route to 57.6.120.0/21 through line 1
- Route to 57.6.96.0/20 through line 1, route to 57.6.112.0/20 through line 2, and route to 57.6.120.0/21 through line 1

Question 9

In figure, A, B, C and D are Autonomous Systems (AS's) that talk to each other using BGP.



(A,B) and (C,D) are peering relationships, while B provides transit service to C and D.

Which of the following communications can **not** happen?

- Packets flow from D to B to A
- Packets flow from D to C to B
- Packets flow from A to B to D
- Packets flow from A to B to C

Question 10

Which of the following protocols would normally **not** run on a typical personal laptop?

- IP
- ICMP
- 802.11 (Wifi)
- BGP

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