Sample Questions

1. What is the maximum number of hosts that a subnetwork can handle, if its network prefix is 192.168.176.0/20 ?
2. A router has the following CIDR entries in its forwarding table:

Address/mask	Next hop
135.46.56.0/22	Interface A
135.46.60.0/22	Interface B
135.46.40.0/23	Interface C
default	Interface D

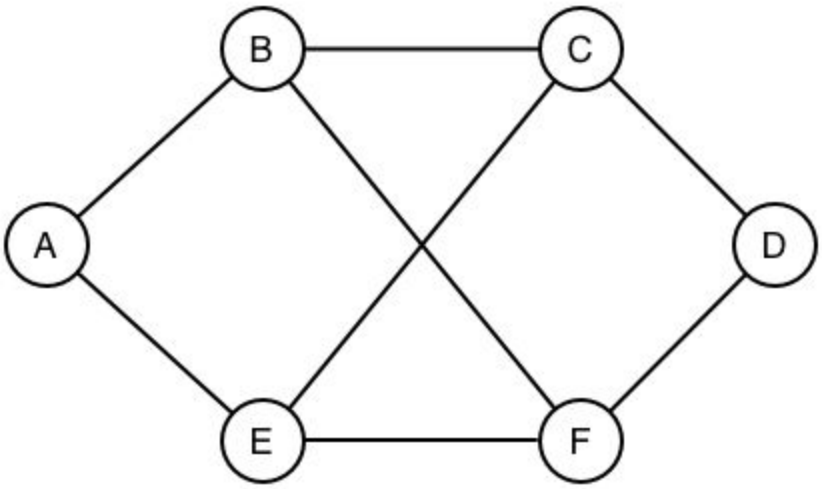
   Where does the router forward it, if a packet with the following IP adress arrives: ***135.46.63.10***

3. A router has the following CIDR entries in its forwarding table:

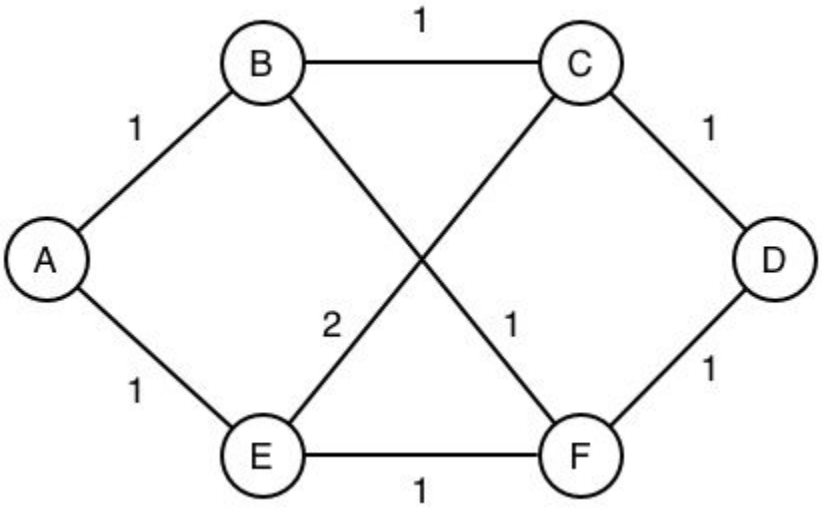
Address/mask	Next hop
135.46.56.0/22	Interface A
135.46.60.0/22	Interface B
135.46.40.0/23	Interface C
default	Interface D

   Where does the router forward it, if a packet with the following IP adress arrives: ***192.53.56.7***

4. All nodes in a networks have been running for a long time when the DHCP server suddenly goes down. What happens to the communication in that network, assuming no new node joins the network?
5. A route from node Anna to Bella goes via routers R1, R2, and R3. The R1–R2 link has maximum segment size of 1000 bytes, while the R2–R3 link has maximum segment size of 600 bytes. If Anna sends two packets of size 1000 bytes and 1500 bytes respectively, what is the total number of packets received by Bella?
6. Consider the network given above. 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?



7. 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?
8. 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.)
9. 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?.



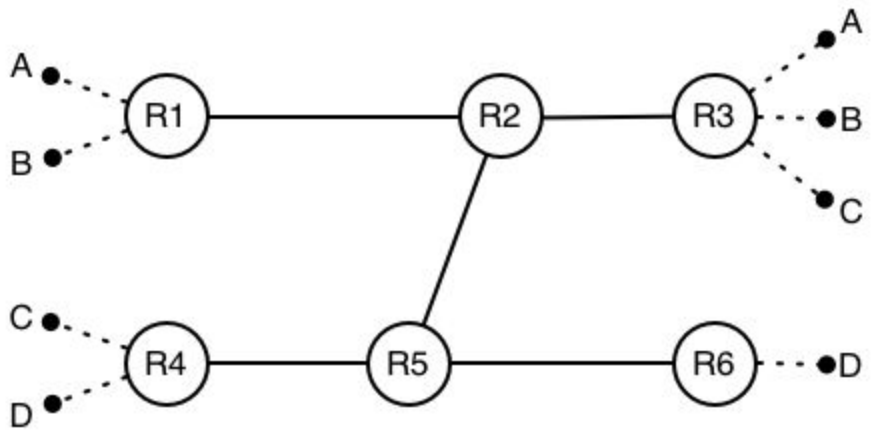
10. Consider the network given above. How many ECMP routes exist from D to A and what is the cost of these routes?
11. A router has just received path announcements for the following IP prefixes:

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?

12. 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 57.6.96.0/20 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 57.6.96.0/19 through line 1, route to 57.6.112.0/21 through line 2
Route to 57.6.96.0/19 through line 1, route to 57.6.112.0/20 through line 2
Route to 57.6.96.0/20 through line 1, route to 57.6.112.0/20 through line 2, and route to 57.6.120.0/21 through line 1

13. What window size W (expressed in packets) is required to utilize the network capacity under the following parameter settings? Packet size is 1250 bytes (10 Kbits), round trip time is 200 ms, and bandwidth of the network path is 10 Mbps.
14. Let a TCP sender send packets with 1000 bytes of data payload per packet, and let the receiver use the cumulative ACK scheme to acknowledge received packets. Consider the following scenario where the sender has sent packets with the following sequence numbers: 5000, 6000, 7000, and 8000. Assume that all packets are received. If the receiver were to end an ACK packet after receiving the packet with sequence number 8000, what is the acknowledgement number sent with this packet?
15. Consider the same setting as the previous question with the sender having sent packets with the following sequence numbers: 5000, 6000, 7000, and 8000. Assume that the third packet with sequence number 7000 is lost, but the other three packets are delivered. If the receiver were to send an ACK packet after receiving the packet with sequence number 8000, what is the acknowledgement number sent with this packet?
16. Consider the network topology shown in the figure with four flows (A, B, C, and D), which flow from left to right (i.e., A flows from R1 on the left to R3 on the right, B flows from R4 on the left to R3 on the right, etc.). Assume that all links have unit capacity. If the flows are allocated based on max-min fair allocation, what is the link utilization of the link R5-R6?



17. Consider the effect of using slow start on a network path with a 10 millisecs round trip time and no congestion (i.e., assume there is no packet loss). Assume that the flow is able to inject back-to-back packets with very little delay. If the flow starts out by sending one packet at time t=0, how many packets are sent between time t=30 ms and t=40 ms?
18. Consider a TCP flow over a 10 millisecs round trip time path. Assume that it is in the Additive Increase phase of transmission and also assume that it transmitted 10 packets between time t=100ms and t=110ms. What is the expected number of packets the flow would transmit between t=120ms and t=130ms assuming that there was no packet loss during this Additive Increase phase?
19. Consider the following sequence of ACK packets from a receiver: ACK packet #1 with ack number 3000, ACK packet #2 with ack number 4000, ACK packet #3 with ack number 5000, ACK packet #4 with ack number 5000, ACK packet #5 with ack number 5000, ACK packet #6 with ack number 5000, and ACK packet #7 with ack number 5000. Assume that the sender employs Fast Retransmit. Which packet is retransmitted by the sender and when is it retransmitted?
20. Which one of the following statements about TCP is true?
    - if the sender does not receive an acknowledgement for a packet, then the packet was lost
    - multiple senders cannot send messages to the same TCP port at a given destination
    - multiple applications on a given machine cannot open the same port on that machine
    - TCP data could be delivered out of order to the application