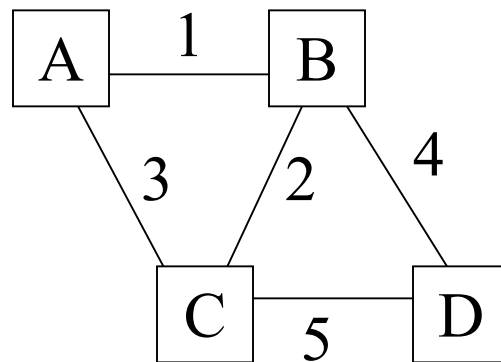


470 Students do problems 1-9, only.

570 Students do problems 1-10.

1. For the network below, Use Dijkstra's Shortest Path Algorithm to find the least-cost distance from A to D. You must show the correct labels for each node for every cycle of the algorithm. Identify the working node for each cycle. (You must clearly show the state at the end of each cycle of the algorithm – if you do not clearly demonstrate that you understand the algorithm, you will get no points).



Labels at the end of each cycle (working node underlined):

	A	B	C	D
Cycle 1	<u>(0,A)</u>	(inf,-)	(inf,-)	(inf,-)
Cycle 2	(0,A)	<u>(1,A)</u>	(3,A)	(inf,-)
Cycle 3	(0,A)	(1,A)	<u>(3,A)</u>	(5,B)
Cycle 4	(0,A)	(1,A)	(3,A)	<u>(5,B)</u>

Path is A,B,D

2. An IP address is 201.14.16.3 (assume classful addressing):

- Write the binary form of the address
11001001 00001110 00010000 00000011
- What class does this address belong to?
C
- What is the number of the network this address is in?
201.14.16
- What is the node number within the network?
3

3. A LAN uses ARP. List and explain the steps that happen from the time that an IP packet arrives at the LAN to when it is delivered.

1. The packet arrives at a node on the LAN.
2. The node checks its ARP table to see if the IP address is in it.
3. If the address is in the ARP table, the node sends the packet to the MAC address indicated in the table.
4. If the address is not in the ARP table, the node broadcasts an ARP Query on the LAN with the required IP address.
5. The node with that IP address broadcasts its MAC address allowing tables at the other nodes to be updated.
6. got to step 2

4. A node has the IP address 142.40.142.7 and the subnet mask 255.255.224.0.

- a. What class does this address belong to?

B

- b. What is the network number?

142.40

- c. What is the subnet number?

128

- d. What is the node number?

14.7

5. a. What does the acronym TCP stand for?

Transmission Control Protocol

- b. Explain what is meant when we say TCP is “reliable”.

All delivered, In order, No error.

- c. Why do we need TCP in addition to UDP?

reliability

6. A router has two inputs, A and B, and uses Weighted Fair Queuing. The router can support a total bandwidth of 100Mbps. Determine a set of weights that would allocate 20Mbps of bandwidth to Input A.

Weight A=1, weight B=4

7. Explain what “admission control” means in the context of QoS.

The negotiation of the “contract” between user and network. The key point is that the network can refuse a QoS request.

8. Use Run-Length Encoding to encode the series of symbols: "AAABBACCAA". What is the compression ratio for this case? Give an example of a series of symbols that would not be benefited by Run-Length Encoding.

3A2B1A2C2A

Comp ratio: If all numbers are sent as ASCII = 1:1. If we use optimum encoding for the numbers, each will be 2 bits long and the total length will be $10 + 5 \times 8 = 50$ bits, so the comp ration will be $10 \times 8 = 80:50$ or 8:5.

The string ABCDEF would not be helped by RLE.

9 Explain how CIDR provides better use of the IP address space.

see notes

10. (570 students only). In the paper, "Netheads vs. Bellheads", the author says: "Instead, Netheads say, forget about quality-of-service guarantees..." Explain the reason that Netheads might feel this way.

The author says that "Netheads" believe that continuing increases in network speed will give all users any level of performance they want, so special measures to implement QoS are unnecessary and, in fact, add complexity that slows the network down.