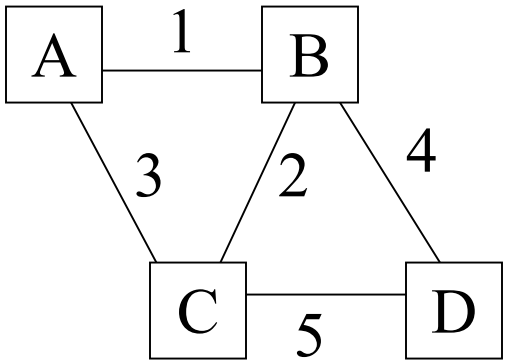
CS470/570 Fall 2003 Midterm 2A Name _____

470 Students do problems 1-9, only.
570 Students do problems 1-10.

1. The network shown below uses Distance Vector routing. Assume that the starting distance vectors are:

```
A = 0  99 99 99
B = 99  0 99  0 99
C = 99 99  0 99
D = 99 99 99  0
```

What are the 4 distance vectors after 3 cycles of the Distance Vector routing algorithm?




```
A  0 1 3 5
B  1 0 2 4
C  3 2 0 5
D  5 4 5 0
```

I also accepted the answer where the starting state was not corrected. This answer is:

```
A  0 1 3 1
B  1 0 2 0
C  3 2 0 5
D  5 4 5 0
```

2. An IP address is 162.255.2.24 (assume classful addressing):
    a. Write the binary form of the address
    10100010 11111111 00000010 00011000
    b. What class does this address belong to?
    B
    c. What is the number of the network this address is in?
    162.255
    d. What is the node number within the network?
    2.24

3. Explain how hierarchical addressing is important to the determination of routing table size. Give an example to support your explanation.

Heirarchical addressing is based on a structured arrangement of subnetworks within networks so that network x.* can be depended on to contain subnetwork x.y.*. This allows network routers to send any traffic for a network with a number "starting with" x. to the x.* router which will forward it to the correct subnetwork. Thus, outside routers do not need to store any routes other than the one for x.*. For the example, I expected something similar to the example given in class.

4. A node has the IP address 180.180.180.180 and the subnet mask 255.255.255.192.
    a. What class does this address belong to?
    B
    b. What is the network number?
    180.180
    c. What is the subnet number?
    180.128
    d. What is the node number?
    52

5. a. What does the acronym UDP stand for?
    User Datagram Protocol
    b. Explain what is meant when we say UDP is "unreliable".
    Does not guarantee: "all delivered, in order, error free"
    c. Why do we need UDP in addition to TCP?
    speed

6. Explain how the DECbit congestion control strategy works.
    When a router senses local congestion, it sets the Congestion Bit in packets it processes. The bit is carried in the header to the receiver and sent to the sender in the ACK. The sender reduces its send rate when it sees the bit is set.

7. Explain what "policing" means in the context of QoS.
Policing is taking action to hold the sender to its Tspec.

8. The string: "heavy heavy hangs over your head" is encoded using the LZ algorithm. Assume that the "phrases" are individual English words (consider spaces).

a. How many bits would it take to transmit the string as ASCII plaintext?
Assuming no space at the end, there are 32 characters, giving 256 bits for ASCII tranmission.

b. How many bits would it take to transmit the string after encoding (assume that the dictionary must be transmitted).
There are 5 phrases, so each phrase is encoded with 3 bits. The dictionary contains 26 characters. The string will need 6x3=18 bits and the dictionary will need 26*8=208 bits for a total of 226 bits.

c. What is the compression ratio for this case?
256:226

9. Explain how IP Tunneling works.
see notes

10. (570 students only) In Clark's paper, he expresses some dissatisfaction with the use of the datagram as the building block of the Internet. Discuss what he suggests might be a building block for the next-generation Internet.
The thing he suggests is "flows". I also accepted most answers based on TCP.