CS 3251 Computer Networks I **Fall Semester, 2000**

Final Examination

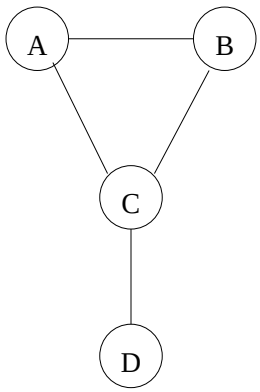
December 11

Be neat and concise. Show your work. Good luck!

Name: _____

Problem	Points	Score
1	15	
2	10	
3	10	
4	10	
5	15	
6	15	
7	10	
8	15	
Total	100	

1. **Distance vector routing.** Consider the following four node topology, and assume all link weights are 1.0:



Assume distance vector routing with split horizon is in use.

(a) Show the row of the distance tables corresponding to destination D at each of the four nodes, assuming steady state has been achieved.

(b) Assume the link (C,D) goes down. Show the entry in the distance vectors for destination D that are exchanged by the nodes, assuming that C sends the first distance vector, followed by B and then A. Assume that B waits to hear from C before sending its distance vector, and A waits to hear from B before sending its distance vector.

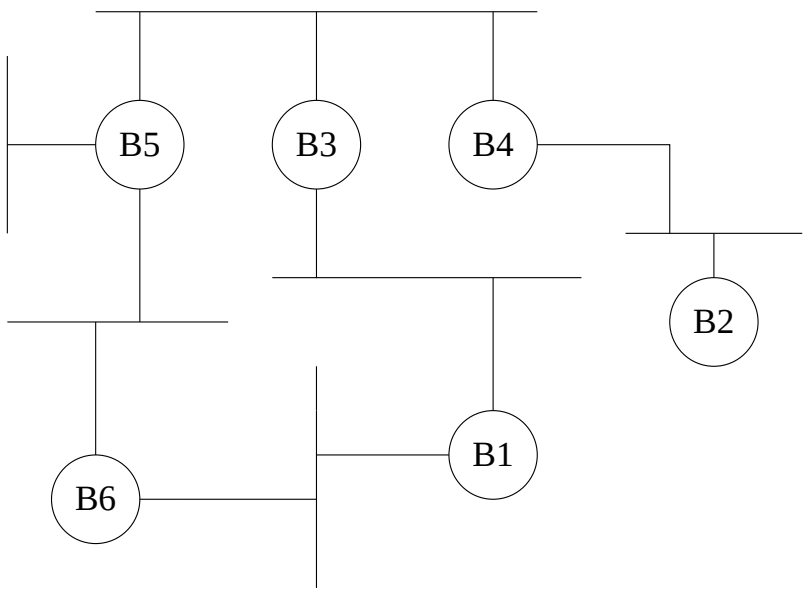
2. **TCP congestion control.** Suppose you are running TCP with a maximum segment size of 1000 bytes. Assume the last acknowledgement received had an acknowledgement field of 1000. Give the (new) value of the TCP sending window under the following conditions:

   (a) The current congestion window is 2000 bytes, and the current slow start threshold is 4000 bytes. An acknowledgement has just been received with an acknowledgement field of 1500 and a window field of 2000.

   (b) Same conditions as part (a) except the current threshold is 1000 and the acknowledgement field is 2000.

3. **TCP RTT Estimation.** Consider a TCP sender that has sent packet i, timed out, resent packet i, and received an acknowledgement for packet i. What adjustments are made to the RTT estimation variables and timeout value when the acknowledgement is received? Explain why.

4. **Ethernet Bridging.** For the topology shown below, mark each port as "on" or "off" according to the algorithm described in class. Assume the bridge IDs are the integers shown on the topology, and that ties are broken in favor of the lower bridge ID.



5. **True/False and Short Answer.** For the True/False questions, state True or False and the reason why.

   (a) Link state routing messages are usually bigger than distance vector routing messages.

   (b) Show the result of bit stuffing on the following data, assuming a FLAG pattern of 01111110: 111110001111111001111111

   (c) Link layer reliability does not require sequence numbers, since frames cannot be received out of order.

   (d) Show the arrangement of the headers when sending an HTTP request over an Ethernet link layer. Label all the headers, and show their order. Do not show the detailed contents of each header.

6. **Ethernet MAC.** Suppose you wanted to give one station priority to transmit on an Ethernet segment. Propose a modification to the Ethernet medium access control algorithm to allow this to occur. Give the new algorithm, and an example to show how your scheme works. Are there any drawbacks to your proposal?

7. **Sockets Programming.** Explain briefly what happens in the endsystem and the network when the `connect()` command is called for a socket of type:

   (a) `SOCK_STREAM`

   (b) `SOCK_DGRAM`

8. **DNS.** Suppose a large number of additional "top-level domains" are added to the name space. (Top-level domains are the last component of domain space names, for example ".com" and ".edu".) How might the DNS (including name servers and clients) need to be changed if this occurs?