CS 3251 Computer Networks I **Fall Semester, 1999**

Midterm Examination 1

September 30

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

Name: _____

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

1. **IP Checksum.** Consider running the IP checksum algorithm over a block consisting of the folloing four 16-bit words: `fabc, ef12, ff34, f8ab`.

   (a) Show the IP checksum computed by the sender.

   (b) Show the computation performed at the receiver, assuming that there is an error that converts `fabc` to `fabb`. Be precise about whether (and how) the receiver knows there is an error.

2. **Short answer.** Give short answers to the following questions:

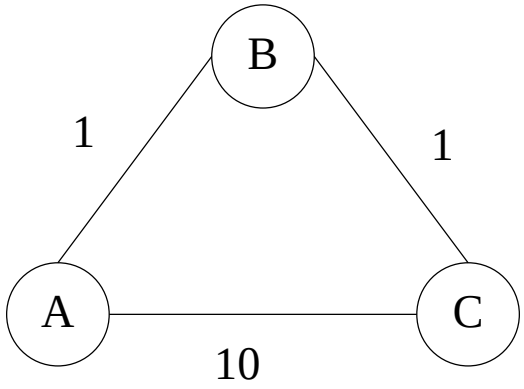
   - Will IP deliver packets with bit errors to the transport protocol? Explain.

   - What is the purpose of the "mask" in an IP forwarding table?

   - What is meaning of a "pseudoheader"? Why is it included in the UDP checksum?

3. **Link state routing.** Give the pseudocode for everything that happens when a router receives a packet containing link state information. (You do not need to describe in detail how the routers view of the topology is modified.)

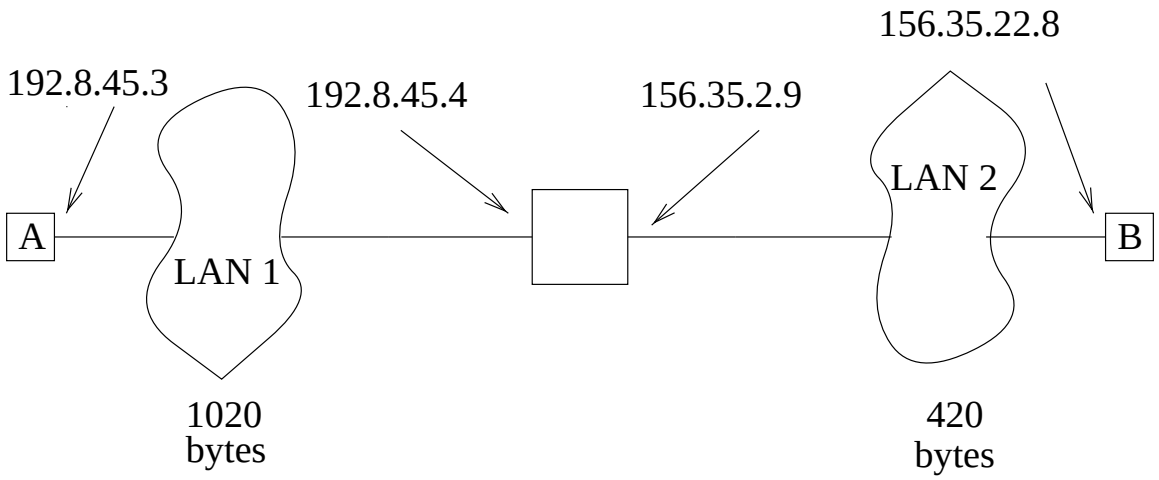
4. **Distance vector routing.** Consider the following three-node topology:



(a) Show the row for destination B in the distance tables at each node.

(b) Explain what happens when the link A–B goes down.

5. **IP.** Suppose an IP packet with 1400 bytes of data and 20 bytes of header is generated at station A, destined for station B. The IP addresses of the interfaces are indicated in the diagram. The largest transmission unit of each local area network (LAN) is indicated in the diagram.



(a) Give the source and destination IP addresses in the fragments of the packet as it traverses LAN 2.

(b) Give the value of the Total Length field, Fragment offset field and More flag field for each of the fragments traversing LAN 2. (Use as many rows of the table below as you need.) Assume that each LAN creates as few fragments as possible (locally) and makes them as large as possible.

Fragment number	Total Length	Fragment Offset	More Flag
0			
1			
2			
3			
4			
5			

6. Give the pseudocode for the processing at the receiver in the Go-back-N protocol. Specify the data structures maintained by the receiver. You should assume the availability of two subroutines, `receiveFromChannel()` which returns a packet received on the channel and `sendToApp(packet)` which delivers a packet to the application that is using the Go-back-N protocol.

7. To achieve reliable transfer, the sender must set a timer based on an estimate of the round trip time (i.e., the time for a packet to go from sender to receiver and an acknowledgement to return). In TCP, the estimate of round trip time is updated based on measurements taken by the sender. Specifically, the sender measures the time from sending a packet until receiving an ACK).

   Use a timing diagram to show that the sender should not update the round trip time estimate when an ACK is received after a retransmission. Explain in words why the measurement is not reliable.