

CSE 123: Computer Networks
Fall Quarter, 2019
MIDTERM EXAM

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Name _____
Student ID _____

Question	Score	Points
1	10	
2	30	
3	25	
4	25	
5	10	
Total	100	

This exam is **closed book**. You are allowed one 8.5x11-inch (or smaller), double-sided sheet of paper containing whatever you would like (a “crib sheet”). **YOU MUST PUT YOUR NAME ON IT AND TURN THE CRIB SHEET IN WITH THE EXAM.**

The exam contains questions of differing point values. Each question is clearly labeled with its value. Please answer all questions in the space provided. You have 50 minutes to complete this exam. As with any exam, I suggest you read through all the questions first before answering any of them.

You will receive full credit for the final question regardless of your answers, but we would appreciate you taking the time to provide feedback. In order to preserve the anonymity of your responses, please **tear off the last page of the exam**. You may submit it separately at the end of the exam, or bring it to class with you on Wednesday.

GOOD LUCK!

1. (10 pts) True/False. Determine whether each of the following statements is true or false. No explanation is necessary; partial credit will not be awarded.

a) Ethernet is a network-layer protocol.

b) Byte stuffing has lower worst-case overhead than (HDLC) bit stuffing.

c) TCP is an example of an ARQ protocol.

d) The .edu TLD nameserver is authoritative for `www.ucsd.edu`.

e) A receiver implementing Go-Back-N flow control needs a receive window of at least $N > 1$.

2. (30 pts) Short Answer. Concisely answer the following questions.

a) (8 pts) Suppose a sender and receiver are using the CRC generator polynomial $x^5 + x^2 + 1$ and the receiver receives the bit string 1110 0110 0011. Was the message received correctly? If so, what was it? If not, how do you know? Show your work.

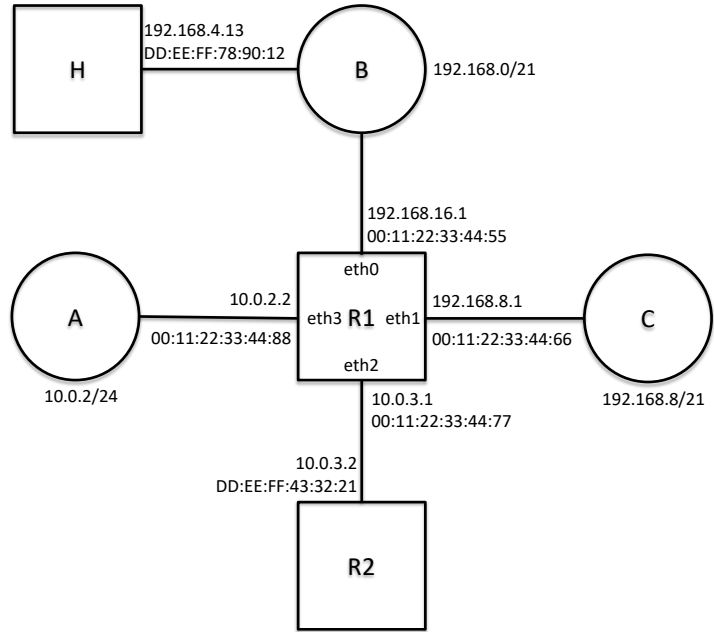
b) (4 pts) Write the IPv6 address AB0C:0000:FF00:0000:00BC:1234:0000:5670 as compactly as possible.

c) (8 pts) What is the rate of a parity code that encodes all two-bit strings into distinct three-bit codewords? How many bit flips can it detect?

d) (10 pts) Suppose a router receives a 1500-byte packet with IP ID 23, MF=1, DF = 0, TTL = 19, and Offset = 1480 (stored as 185 in the header). It decides to forward the packet out a port where the MTU is only 500 bytes. What are the contents of the following header fields for the last fragment sent?

IPID: MF: DF: TTL: Len: Offset:

3. (25 pts) Consider the IP network shown below, where H is a host, $R1$ and $R2$ are routers, A , B , and C are networks (whose CIDR prefixes are shown), and each host and router interface has the IP and Ethernet MAC addresses shown.



Assume the following packet arrives at R1

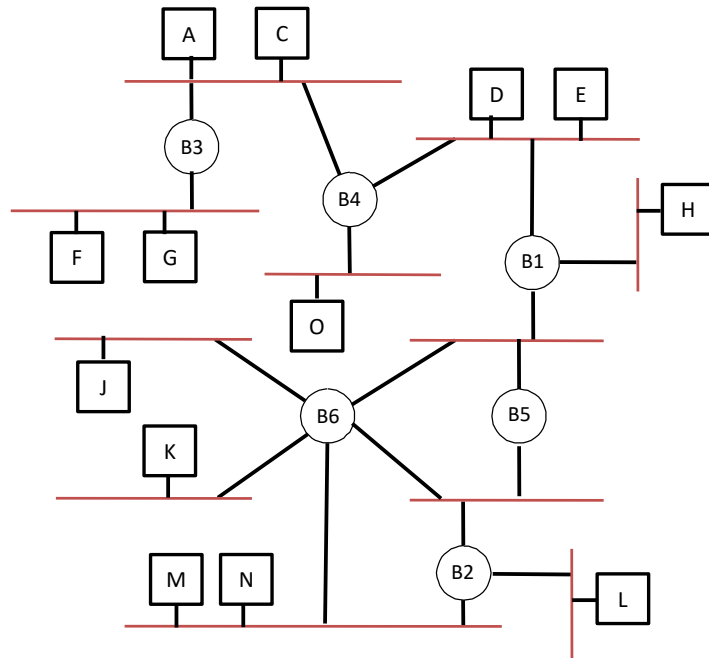
Eth Src	Eth Dst	IP Src	IP Dst	TTL
DD:EE:FF:43:32:21	00:11:22:33:44:77	172.89.32.4	192.168.4.13	17

- a) (5 pts). At which of R1's interface must it have arrived?
- b) (5 pts). Out which interface should R1 forward it (assuming its forwarding tables are correct)?
- c) (10 pts). What should the headers look like as the packet leaves that interface?

Eth Src	Eth Dst	IP Src	IP Dst	TTL

- d) (5 pts). Suppose host H wanted to send a packet to a host on network C with IP address 192.168.8.12, but its ARP cache is currently empty. Before it could send an IP packet, it would need to send an ARP request. What IP would it ask about, and who would respond?

4. (25 pts) Consider the extended LAN shown below; circles correspond to learning bridges while squares are hosts. Assume all bridges were just turned on and no frames have been sent.



- a) (5 pts). Indicate on the figure which ports—if any—will be turned off in the final spanning tree. (Mark an X on the relevant ports.)
- b) (5 pts). What is the final configuration message being sent by B2 (Make sure you indicate what each field specifies)?
- c) (15 pts). Suppose the following frames (and only these frames) are sent in the order indicated. For each frame, say which hosts will receive it.

Frame	Recipients
M sends a message to N	
N sends a message to M	
F sends a message to M	

