

CSE 123: Computer Networks
Fall Quarter, 2017
MIDTERM EXAM

Instructor: Alex C. Snoeren

Name _____ **SOLUTIONS** _____
Student ID _____

Question	Score	Points
1	20	20
2	20	20
3	30	30
4	20	20
5	10	10
Total	10	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 next Wednesday.

GOOD LUCK!

1. (20 pts) Short Answer. Concisely answer the following questions.

- b) (8 pts) Imagine you were asked to design a code over three-bit strings that could correct all single bit flips, and were told that 111 had to be a codeword. What other codewords could be in your code? What is the efficiency of your code?

000, 33%.

- c) (6 pts) Imagine an HDLC sender wants to send the message 0x3EA0. What is the sequence of bits that results after stuffing?

0011 1110 1010 0000 results in 0011 1110 0101 0000 0

- d) (6 pts) Suppose a router receives a 1500-byte IPv4 packet with a 20-byte IP header, IP ID x , MF = 0, and DF=0. It needs to forward it out a link with a 500-byte MTU. What should the IP ID, length, offset, and flags (i.e., MF and DF) fields of the header of the 3rd fragment contain?

x , 500, $960/8=120$, MF=1, and DF=0.

2. (20 pts) Suppose a sender and receiver pair are using the CRC generator polynomial $x^{10} + x^9 + x^5 + x^4 + x^1 + 1$ to protect their messages.

a) (4 pts) How long a burst error are they protected against?

10 bits.

b) (8 pts) Suppose the receiver receives the following 26 bits: 1111 0001 1010 1001 1011 1100 11. What are the encoded message and frame check sequence?

1111 0001 1010 1001 and 1011 1100 11

c) (8 pts) Was the message received correctly? Show your work.

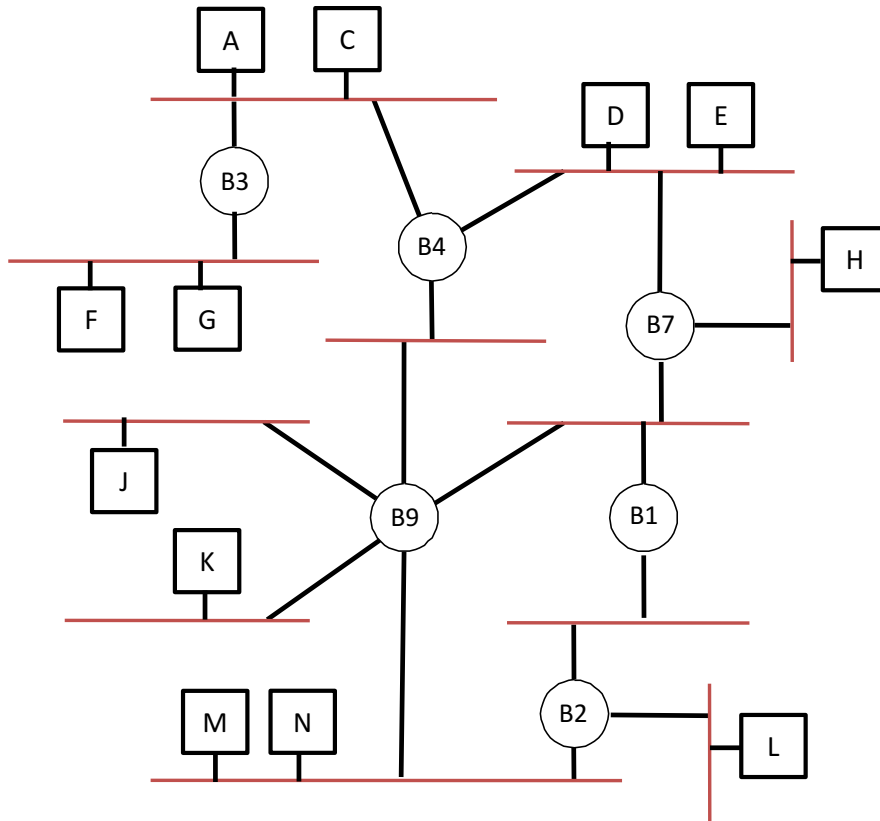
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1100 0110 011 | 1111 0001 1010 1001 1011 1100 11
                1100 0110 011
                  11 0111 1100 1
                   11 0001 1001 1
                     110 0101 0001
                      110 0011 0011
                        110 0010 1011
                          110 0011 0011
                            1 1000 1100 11
                             1 1000 1100 11

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Yes.

3. (30 pts) Consider the extended LAN shown below; circles correspond to bridges while squares are hosts. Assume all bridges were just turned on and no frames have been sent.



a) (10 pts). Indicate on the figure which ports—if any—will be turned off in the final spanning tree.

B4 and B9's southbound ports

b) (5 pts). What is the final configuration message being sent by B4?

(B4, 2, B1) is sent to B3.

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
A sends a message to L	Everyone
H sends a message to A	A, C, D, E, and H
M sends a message to H	J, K, M, N, L, and H

4. (20 pts) Consider the IPv4 address 18.26.0.127.

- a) Suppose that we were still using class-based addressing. What type of network would this IP address be a part of?

Class A.

- b) If the network administrator had decided to break the network in part a) into 32 different subnets, what would the subnet mask of the subnet to which this IP address belongs be?

11111111.11111000.00000000.00000000 or 255.248.0.0

- c) What is the subnet number (address) of the subnet to which this IP address would be attached?

18.24.0.0

- d) Now suppose instead that we are using CIDR addressing instead of Class-based addressing and subnets. What would the length of CIDR prefix for the physical network in part c) to which the host were attached be?

/13.

