This homework is due at 11:59:59 PM on September 25, 2020 and is worth 3% of your grade.

Name: _____

CCIS Username: _____

Problem	Possible	Score
1	30	
2	20	
3	25	
Total	75	

1a. Draw in the NRZ, NRZI and Manchester encodings for the bit pattern below.

$$1\ 0\ 1\ 1\ 0\ 1\ 0\ 1\ 1\ 1\ 0\ 0\ 0\ 1\ 0\ 1\ 1\ 0\ 0$$

Clock

NRZ

NRZI

Manchester

You can use Figure 2.10 of Peterson and Davie as a model. (10 pts)

1b. Apply the bit-stuffing protocol to the pattern below and write down the resulting sequence in the boxes provided. You do not need to include any start frame/end frame sequences. .

$$0101101111111011111111001$$

You may not need to use all of the boxes. (10 pts)

1c. If the bit pattern below is received at a bit-stuffing receiver, what is the interpretation of this pattern?

$$01111110101111011011111000011111110$$

You may not need to use all of the boxes. (10 pts)

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2a. Why is it important for protocols configured on top of Ethernet to have a length field in their header indicating how long the message is? (5 pts)

2b. What kinds of problems can arise when two hosts on the same Ethernet share the same hardware address? Describe what happens and why that behavior is a problem. (10 pts)

2c. Give **two** reasons why Ethernet sends a 64-bit preamble before every packet consisting of alternating 0s and 1s. (5 pts)

3a. Suppose that we have an Ethernet which has a bandwidth of 5 megabits/second. If the speed of light in copper is assumed to be 2.5×10^8 meters/second, what is the minimum frame size that we must select for a LAN of length 10,000 meters? *Note that there are 1000 bits in a kilobit, 1000 kilobits in a megabit, etc.* (10 pts)

3b. Suppose the layout of our LAN is as shown below.
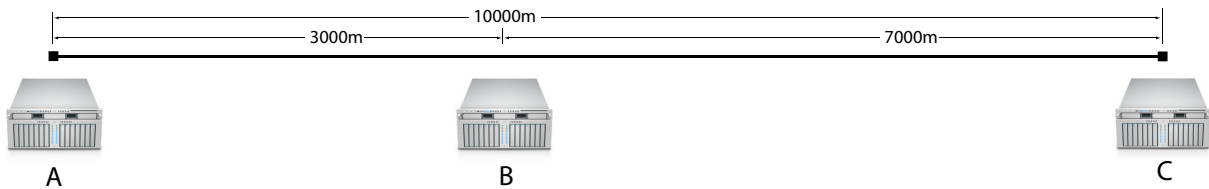
What would happen if host A transmitted a frame that was smaller than this minimum frame size? Under what circumstances would problems occur? (10 pts)

3c. What is the minimum frame size that host B could send without any problems? (5 pts)

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