

*This homework is due at 11:59:59 PM on September 26, 2022 and is worth 3% of your grade.*

Name: \_\_\_\_\_

NUID (with leading zeros): \_\_\_\_\_

<b>Problem</b>	<b>Possible</b>	<b>Score</b>
1	30	
2	20	
3	25	
Total	75	





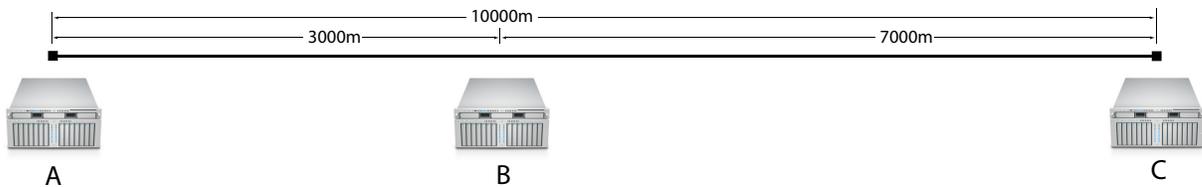
2a. Why is it important for protocols configured on top of Ethernet to have a length field in their header indicating how long the message is? (5 pts)

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. Why does the Ethernet protocol include a 64-bit preamble before every packet that consists 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  $2.5 \times 10^8$  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)