

Put your name on the back in the upper right-hand corner and fold your quiz lengthwise - Thanks.

## CS 440 Quiz 4

1. If your CRC generating polynomial is 11011 and the message is 1000101, what do you transmit?

- (a) Add 4 zeros to augment the message: 10001010000
- (b) Divide 10001010000 by 11011 modulo one and get the remainder. The remainder is 0001.
- (c) Add/subtract/xor the remainder to the augmented message (one's complement arithmetic).  $10001010000 \oplus 0001 = 10001010001$ .
- (d) Send it.

2. You buy DSL from a local company and they claim to provide you will get 128 Kbps upstream and 256 Kbps downstream. Explain how they would do this.

They would provide you with  $128/4 = 32$  4 KHz channels upstream and  $256/4 = 64$  4 KHz channels downstream. The data is spread across the channels with bits sent in parallel as needed.

3. After you get it installed, you download a file of 1024 Kbps (downstream) and it takes 6 seconds. What is the utilization of the your network connection.

The utilization is:  $U = \frac{DataTime}{TotalTime}$ . It should take 4 seconds to send the data, so the utilization is:

$$U = \frac{4 \text{ seconds}}{6 \text{ seconds}} = 0.667$$

4. Why does an Ethernet frame have a minimum frame length?

So that a sender will know with certainty that a message sent has or has not been involved in a collision.