ECE 4380/6380: Computer Communications **Spring 2017**
Problem Set 2 **Due: 2:30 pm in class, Monday, February 6**

Assigned reading: Peterson and Davie, Chapter 2.1-2.5. All problems have equal weight.

1. **Encoding**. Chapter 2, number 1
2. **Encoding**. Chapter 2, number 4
3. **Framing**. Chapter 2, number 5
4. **Framing**. Chapter 2, number 8

5. **Error detection with CRC**. The polynomial $x^{12} + x^{11} + x^3 + x^2 + 1$ is not a good choice for the divisor polynomial, C(x), for a CRC-12 code because it cannot detect all odd bit errors. Show why this is the case

6. Using the CRC-8 generator polynomial $x^8 + x^2 + x + 1$, calculate the CRC value of the bit sequence `0011 1010 1011`, and list the message that should be transmitted.

7. Find a 13-bit burst error polynomial that cannot be detected by the CRC-8 check. The burst error polynomial must have the form $E(x) = x^{12} + \ldots + 1$, and the terms x^k for $k = 1, 2, \ldots, 11$ can have a coefficient of either 0 or 1. Here is a 13-bit burst error polynomial that can be detected: $x^{12} + x^8 + x^2 + x + 1$. The CRC-8 generator polynomial is $x^8 + x^2 + x + 1$. (By a 13-bit burst error we mean that there has been a burst of energy that causes noise on the communication channel during the span of 13 bits. For example, the energy may drive the voltage to a high value for all 13 bits. Some of those bits might have been 1's (and represented by the high voltage), so the energy does not cause those bits to be in error. So, assume the first and thirteenth bits are incorrect, and the bits in between those two end points may or may not be in error.)