CS 6380 Computer Networks		**Fall Quarter, 1997**
	Homework 1	
Assigned: October 2		*Due: October 9*

Reminder: Late homeworks will NOT be accepted!

1. For polynomial $P = 10111$, find a message M and bit error pattern such that the CRC does not detect the error. Demonstrate this by showing the encoding process, the locations of the bit errors, and the decoding process.

2. The **Hamming distance** between two codewords is the number of bits in which they differ. For example, the Hamming distance between codewords 1011 and 0110 is 3. The Hamming distance of a **code** is the minimum Hamming distance between **any** two codewords in the code. What is the Hamming distance of a code that uses one parity bit to check the odd numbered bits and a second parity bit to check the even numbered bits? What are the error detection and correction capabilities of this code?

3. The **bit error rate** of a physical channel is the probability that a bit is in error. Assume that each bit is in error independently with bit error rate $p = 10^{-3}$. Consider a frame of eight bits, divided into two four-bit characters. Let P denote the probability that the frame is received with no undetected errors.

   (a) Assume no error coding is used. What is P?

   (b) Assume that a parity bit is added to each character. What is P?

4. This problem involves programming in C and requires you to work in groups of two. (Send me email if you are looking for a partner.) One of you will write a CRC encoder function called `crc-encode`; the other will write a CRC decoder function called `crc-decode`. It must be possible for the output of the encoder to be fed directly into the input of the decoder using a call of the form `crc-decode(crc-encode(·))`. (Note that the exact inputs to the crc-encode function are not specified.)

   This will require you to agree on a protocol that allows the two functions to work together in this way. You should discuss the protocol, however **each of you should work independently on the actual body of the code for your function**. You should turn in the two functions, and a demonstration that they work together as required.

5. Read the paper "Consistent Overhead Byte Stuffing," S. Cheshire and M. Baker, Sigcomm'97. A pointer to the paper can be found on the course web page. Write a concise evaluation of the paper. The first paragraph should summarize the paper, in your own words. The second paragraph should reflect on how this work is different than what you have seen in class.