

TCOM 370

Homework 5

Due Tuesday, March 16, 1999

Problem 1

#3 in 1998 Exam 2

Problem 2

#1 in 1997 Exam 2

Problem 3

Using the CRC-CCITT polynomial $G(X)$ in your textbook, generate by long division the 16-bit CRC frame check sequence for a message consisting of a single "1" followed by fifteen "0"s. (The most significant bit is the "1"). Also draw a shift register implementation of the long division.

(the polynomial $G(X)$ is $X^{16}+X^{12}+X^5+1$)

Problem 4 [turn in parts (a) and (c)]

(a) Consider a message sequence 010101 and the divisor 1011. Work out the FCS for this by doing polynomial or long division.

Then you will verify in (b) and (c) below that a shift-register implementation of the coder and decoder defined according to the discussion in Notes 9 does indeed yield the FCS for this example:

Don't turn in part (b)

(b) For the coder, create a table similar to the one for the encoder example given in Notes 9. The three shift register contents are initially all 0. When the first message bit (0) comes in, the feedback bit is computed as "0", and this appears at the left-most shift register input line as well as at the XOR inputs between the shift registers. The inputs for all the shift registers can now be determined, and the shift register entries are updated. Then the process continues ...

Show that after the last message bit has come in, the shift registers contain the desired remainder.

(Note: shift registers shown right next to each other without an XOR between them means the output line of one shift register goes directly into input line of next shift register)

Turn in part (c):

(c) Draw a similar table for the decoder, where the input is now the message bits

followed by the FCS. What is the remainder at the end?