

Homework 5

Due at the beginning of class, 10/19/2022

1. **(20)** Please finish the table in the last page of the lecture slides by using the CRC check bit generation circuit above. Hint: in step 10, when you update shift registers, the check bits will be found.
2. **(10)** Two communicating devices are using a single-bit even parity check for error detection. The transmitter sends the byte 10101010 and, because of channel noise, the receiver gets the byte 10011010. Will the receiver detect the error? Why or why not?
3. **(20)** For $P=110011$ and $D=11100011$, find the CRC.
4. **(30)** A CRC is constructed to generate a 4-bit FCS for a 9-bit message. The generator polynomial is X^4+X^3+1 .
 - a) Draw the shift-register circuit that would perform this task.
 - b) Encode the data bit sequence 111011001 using the generator polynomial and give the codeword $T(X)$.
 - c) Now assume that the 7th bit (counting from the left side) in the codeword is in error and show that the detection algorithm detects the error.
5. **(20)** Calculate the Hamming pairwise distance among the following codewords and find the minimum Hamming distance. Then analysis the capability of the codewords:
 - a) 00000, 10101, 01010
 - b) 000000, 010101, 101010, 110110
6. **(Extra 10)** Join the discussion of Robotics on Blackboard. Attach only the screenshot of your answer from Blackboard.