ECE363 Assignment 2

Student ID:

1. Let 01111110 be the FLAG. To transmit the flowing bit string 011110000111110001111110 at the data link layer, what is the string actually transmitted after **bit stuffing**?

2. The following character encoding is used in a data link protocol: A: 01111000; B:01111100; FLAG: 01111110; ESC: 11100000
   Show the bit sequence transmitted (in binary) for the four-character frame: "A B ESC FLAG" when FLAG bytes with **byte stuffing** is used.

3. An 8-bit byte with binary value 10101100 is to be encoded using Hamming code. What is the binary value after encoding? [Hint: use 4 check bits]

4. A bit stream 10011100 is transmitted using the standard CRC method. The generator polynomial is $x^3 + 1$.

   a) Show the actual bit string transmitted.

   b) Suppose one bit is inverted during transmission. Show that this error is detected at the receiver's end.

5. With the 2-D parity method, a block of bits with n rows and k columns uses horizontal and vertical parity bits for error correction or detection. During the class, we show that 2-D parity method can *correct* single bit errors.

   (a) Please explain whether the 2-D parity method can *detect* all double errors? Triple errors?

   (b) Find an example of a pattern of six errors that cannot be *detected* by the use of 2-D parity method.