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CS 35201
Homework 3

1. The following character encoding is used in a data link protocol:
   A: 01000111 B: 11100011 FLAG: 01111110 ESC: 11100000
   Show the bit sequence transmitted (in binary) for the four-character frame A B ESC FLAG when each of the following framing methods is used:
   (a) Byte count.

   00000100 01000111 11100011 11100000 01111110

   (b) Flag bytes with byte stuffing.

   01111110 01000111 11100011 11100000 11100000 11100000 01111110 01111110

   (c) Starting and ending flag bytes with bit stuffing.

   01111110 01000111 110100011 11100000 011111010 01111110

2. To provide more reliability than a single parity bit can give, an error-detecting coding scheme uses one parity bit for checking all the odd-numbered bits and a second parity bit for all the even-numbered bits. What is the Hamming distance of this code? Hint: How many bits have to be in error to make another valid code. Think about errors in odd/even places.

Even though there is a parity bit for even number bits and another parity bit for odd numbered bits this code can detect all single bit errors and some 2-bit errors, with d=1. The hamming distance of this code is d+1=2

3. Suppose that a message 1001 1100 1010 0011 is transmitted using Internet Checksum (4-bit word). What is the value of the checksum?

0011+1010=1101

1101+1100=1001+1=1010

1010+1001=0011+1=1100

Thus the check sum is 1100

4. Using the convolutional coder of Fig. 3-7, what is the output sequence when the input sequence is 10101010 (left to right) and the internal state is initially all zero?

When the first 1 goes in the output is 11 and S1 is saved to be 1. When 0 goes in the output is 01 and S2 becomes 1 and S1 goes to 0. Resulting in the complete output sequence:

11 01 00 10 10 00 11 00