CNT5505 Homework No. 3

(Given October 2, due October 9)

(Note: you can either do this as an individual homework or form a group of 2 to do this homework.)

1. (Problem 3, page 252) The following data fragment occurs in the middle of a data stream for which byte-stuffing algorithm described in the text is used: A B ESC C ESC FLAG FLAG D. What is the output after stuffing?
2. (Problem 4, page 252) A bit string, 0111101111101111110, needs to be transmitted at the data link layer. What is the string actually transmitted after bit stuffing?
3. (Problem 8, page 252) 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?
4. (Problem 12, page 252) Suppose that data are transmitted in blocks of sizes 1000 bits. What is the maximum error rate under which error detection and retransmission mechanism (1 parity bit per block) is better than using Hamming code? Assume that bit errors are independent of one another and no bit error occurs during retransmission.
5. (Problem 17, page 252) A bit stream 10011101 is transmitted using the standard CRC method described in the text. The generator polynomial is x3+1. Show the actual bit string transmitted. Suppose that the third bit from the left is inverted during transmission. Show that this error is detected at the receiver's end. Given an example of bit errors in the bit string transmitted that will not be detected by the receiver.
6. (Problem 20, page 253) A channel has a bit rate of 4 kpbs and a propagation delay of 20 msec. for what range of frame sizes does stop-and-wait give an efficiency of at least 50%.
7. (Problem 32, page 254) Frames of 1000 bits are sent over a 1-Mbps channel using a geostationary satellite whose propagation time from the earth is 270 msec. Acknowledgements are always piggybacked onto data frames. Th eheaders are very short. Three-bit sequence numbers are used. What is the maximum achievable channel utilization for

(a) Stop-and-wait

(b) Protocol 5?

(c) Protocol 6?

1. (Problem 34, page 254) consider an error-free 64-kbps satellite channel used to send 512-byte data frames in one direction, which very short acknowledgements coming back the other way. What is the maximum throughput for window sizes of 1, 7, 15, and 127? The earth-satellite propagation time is 270 msec.