Introduction to Computer Networks

Midterm Exam#1

April 28, 2000

1. What is the maximum data rate at which data can be sent across a transmission system that has a bandwidth of 4000 Hz and uses 16 values of voltage to encode information? (5%)
2. Why the CRC error check is used in most communication systems?(8%) Use modulo 2 arithmetic to compute the CRC code for message 10100001 with the generator polynomial $x**3 + x + 1$.(5%) Draw the diagram of the hardware to compute CRC code for the above example.(7%) Give a transmission error that cannot be detected by the above generator polynomial.(5%)
3. The bit stuffing technique is used for data framing in HDLC data link standard. What is the output string with the input string 0111101111101111110. (10%)
4. State the purpose of "carrier sense" in an Ethernet LAN. (7%) Explain why a binary exponential backoff is used after a packet collision. (8%)
5. Explain why the bit rate of a T1 line is 1.544 Mbps. (10%)
6. State the main difference of the distance vector routing protocol and link state routing protocol. (10%) State advantage and disadvantage of using each of these two protocols. (10%)
7. Refer to the network in Figure 10.4 in page 132. What is the minimal number of frames that are needed to send by the computers for the bridge B to learn the locations of all computers? (10%) Explain why a distributed spanning tree algorithm is usually used in bridges in LANs. (10%)