CMPUT 313 (SECTION B1)
Telecommunications and Computers
Prof. L Nikolaidis
MIDTERM EXAM
WEIGHT: 22%
March 2nd, 2000

Student Name: _____

Student ID: _____

Enter your name and student ID in the space provided above. This question sheet must be returned along with your exam booklet. This is CLOSED BOOK exam. All intermediate steps, all intermediate results and all assumptions used in the answers must be provided in order to obtain full marks.

1. (15%) List and briefly explain four reasons that complicate the implementation of a bridge between 802.3 (Ethernet) and 802.5 (Token Ring) networks.

2. (15%) In Selective-Repeat, with window size equal to four, the receiver's window currently anticipates the arrival of frames with sequence number from 3 to 6 (inclusive). Frames 0, 1 and 2 have already been received and acknowledged by the receiver. Frame 4 is received. 3, 5 and 6 have not been received yet. What are the appropriate actions of the receiver immediately upon receiving frame 4? After the appropriate action(s) are taken for the arrival of frame 4, a new frame arrives. This time it is the frame with sequence number 2. What are the appropriate actions of the receiver upon arrival of frame 2? (Assume an infinite range of sequence numbers, starting from 0.) Provide a timing diagram that describes the above scenario.

3. (15 %) Consider the adaptive tree walk protocol and its extensions. Assume that the number of nodes is 16 and that stations are indexed from 1 to 16. What is the *minimum* number of necessary slots (includes: idle slots, collision slots and correct frame transmissions) if stations 3, 4, 8 and 16 have a frame to send? Present the exact sequence of slots and explain what happens in each slot. If you had a-priori knowledge of the number of stations that have a frame to transmit (in this case four) how many slots would have been necessary? Again, present and explain the sequence of slots.

4. (15 %) Calculate the CRC remainder for the data 1001001011 assuming the generator polynomial is 1011. Indicate what the transmitted message will be. The message is corrupted by a four bit error. Give an example of a received message which corresponds to the transmitted message and includes a four bit error that *cannot* be detected by the CRC polynomial that we used.

5. (10 %) If a CRC polynomial can detect all single bit errors, can it also detect all *single bit insertion* errors? Explain.

6. (15 %) You observe a Slotted ALOHA system and determine that half the slots are idle. What is the system's throughput? (Slotted ALOHA throughput: $S = Ge^{-G}$)

7. (15 %) Compare and contrast (a) transparent backward learning and (b) source routing bridges. Be thorough in your answer.