第三章作业如下：

3-1. The following data fragment occurs in the middle of a data stream for which the byte stuffing algorithm described in the text is used: A B ESC C ESC FLAG FLAG D. What is the output after stuffing?

3-2. Can you think of any circumstances under which an open-loop protocol (e.g., a Hamming code) might be preferable to the feedback-type protocols discussed throughout this chapter?

3-3. An 8-bit byte with binary value 10101111 is to be encoded using an even-parity Hamming code. What is the binary value after encoding?

3-4. What is the remainder obtained by dividing x7 + x5 +1by the generator polynomial x3+1?

3-5. Suppose that a message 1001 1100 1010 0011 is transmitted using Internet Checksum (4-bit word). What is the value of the checksum?

3-6. A channel has a bit rate of 4 kbps and a propagation delay of 20 msec. For what range of frame sizes does stop-and-wait give an efficiency of at least 50%?

3-7. A 3000-km-long T1 trunk is used to transmit 64-byte frames using protocol 5. If the propagation speed is 6 μsec/km, how many bits should the sequence numbers be?

3-8. In protocol 6, when a data frame arrives, a check is made to see if the sequence number differs from the one expected and no nak is true. If both conditions hold, aNAK is sent. Otherwise, the auxiliary timer is started. Suppose that the else clause were omitted. Would this change affect the protocol’s correctness?

3-9. Suppose that the three-statement while loop near the end of protocol 6 was removed from the code. Would this affect the correctness of the protocol or just the performance? Explain your answer.

3-10. 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. The headers 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?