1. A group of N stations share a 56-kbps pure ALOHA channel. Each station outputs a 1000-bit frame on average once every 100 sec, even if the previous one has not yet been sent (e.g., the stations can buffer outgoing frames). What is the maximum value of N?

2. A large population of ALOHA users manages to generate 50 requests/sec, including both originals and retransmissions. Time is slotted in units of 40 msec.
(a) What is the chance of success on the first attempt?
(b) What is the probability of exactly k collisions and then a success?
(c) What is the expected number of transmission attempts needed?

3. What is the length of a contention slot in CSMA/CD for
(a) a 2-km twin-lead cable (signal propagation speed is 82% of the signal propagation speed in vacuum)? And
(b) a 40-km multimode fiber optic cable (signal propagation speed is 65% of the signal propagation speed in vacuum)?

4. How long does a station, s, have to wait in the worst case before it can start transmitting its frame over a LAN that uses the basic bit-map protocol?

5. In the binary countdown protocol, explain how a lower-numbered station may be starved from sending a packet.

6. Sixteen stations, numbered 1 through 16, are contending for the use of a shared channel by using the adaptive tree walk protocol. If all the stations whose addresses are prime numbers suddenly become ready at once, how many bit slots are needed to resolve the contention?

7. Give an example to show that the RTS/CTS in the 802.11 protocol is a little different than in the MACA protocol.

8. List two ways in which WiMAX is similar to 802.11, and two ways in which it is different from 802.11.

9. Store-and-forward switches have an advantage over cut-through switches with respect to damaged frames. Explain what it is.