SECTION 5.3

R4. Suppose two nodes start to transmit at the same time a packet of length L over a broadcast channel of rate R. Denote the propagation delay between the two nodes as d_{prop}. Will there be a collision if $d_{prop} < L/R$? Why or why not?

R5. In Section 5.3, we listed four desirable characteristics of a broadcast channel. Which of these characteristics does slotted ALOHA have? Which of these characteristics does token passing have?

R6. In CSMA/CD, after the fifth collision, what is the probability that a node chooses $K = 4$? The result $K = 4$ corresponds to a delay of how many seconds on a 10 Mbps Ethernet?

R7. Describe polling and token-passing protocols using the analogy of cocktail party interactions.

R8. Why would the token-ring protocol be inefficient if a LAN had a very large perimeter?

SECTION 5.4

R9. How big is the MAC address space? The IPv4 address space? The IPv6 address space?

R10. Suppose nodes A, B, and C each attach to the same broadcast LAN (through their adapters). If A sends thousands of IP datagrams to B with each encapsulating frame addressed to the MAC address of B, will C's adapter process these frames? If so, will C's adapter pass the IP datagrams in these frames to the network layer C? How would your answers change if A sends frames with the MAC broadcast address?

R11. Why is an ARP query sent within a broadcast frame? Why is an ARP response sent within a frame with a specific destination MAC address?

R12. For the network in Figure 5.19, the router has two ARP modules, each with its own ARP table. Is it possible that the same MAC address appears in both
tables?

R13. Compare the frame structures for 10BASE-T, 100BASE-T, and Gigabit Eth-
ernet. How do they differ?

RI4. Consider Figure 5.15. How many subnetworks are there, in the addressing sense of Section 4.4?

R15. What is the maximum number of VLANs that can be configured on a switch supporting the 802.1Q protocol? Why?

R16. Suppose that /V switches supporting K VLAN groups are to be connected via a trunking protocol. How many ports are needed to connect the switches? Justify your answer.