

1. Compute the CRC for the bits 10101010 using the generator $G = 1001$.
(Answer: 101)
2. **(Modified from KR, Chapter 5, P7)** In this problem, we explore some of the properties of CRC. For the generator $G = 1001$,
 - (a) why can it detect any single bit error in data D ?
 - (b) can the above G detect any odd number of bit errors? why? (Hint: any number with odd number of ones cannot be divisible by 11).
3. Nodes A and B are accessing the same shared medium using CSMA/CD, with a propagation delay of 245 bit times between them. The minimum frame size is 64 bytes. Suppose node A begins transmitting a frame and, before it finishes, node B begins transmitting a frame.
 - (a) What is the minimum possible time taken by A to finish transmission?
 - (b) When is the latest time, by which B can begin its transmission?
 - (c) Can A finish transmitting before it detects that B has transmitted?

Express all your answers above in the unit of bit time.

4. **(KR, Chapter 5, P19)** Suppose nodes A and B are on the same 10 Mbps Ethernet segment, and the propagation delay between two nodes is 245 bit times. Suppose A and B send frames at the same time, the frames collide, and then A and B choose different values of K in the CSMA/CD algorithm. Assuming no other nodes are active, can the retransmission from A and B collide?

Work out the following example. Suppose A and B begin transmission at $t = 0$ bit times. They both detect collisions at $t = 245$ bit times. Suppose $K_A = 0$ and $K_B = 1$. At what time does B schedule its retransmission? At what time does A begin transmission? (Note that a node must wait for an idle channel after returning to Step 2 – see protocol.) At what time does A 's signal reach B ? Does B refrain from transmitting at its scheduled time?