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?