ECE363 Assignment 2

Student ID:
Student Name:

1. A bit stream 10011101 is transmitted using the standard CRC method.
    a. The generator polynomial is x^3 + 1. Show the actual bit string transmitted.
    b. Suppose that the third bit from the left is inverted during transmission. Can this error be detected at the receiver's end? If yes, how?
    c. Give an example of bit errors in the bit string transmitted that will not be detected by the receiver, along with a **detailed explanation** of why these errors remain undetected.

2. Please compare and analyze the pros and cons of CSMA/CD protocol and TDMA.

3. Assume a CSMA/CD network with a length of 1 km and a data rate of 1 Gb/s. The propagation speed of signals on the network is 200,000 km/s. Find the minimum frame length that can be used with this protocol. (**Hints**: *The minimum frame length in CSMA/CD is determined by ensuring that a sender can detect a collision before it finishes transmitting the frame. This is based on the round-trip time of the signal propagation in the network.*)

4. There are 10 stations connected to an Ethernet network. Analyze the bandwidth that each station can obtain in the following three scenarios:
    a. 10 stations connected to a 10 Mbit/s Ethernet hub
    b. 10 stations connected to a 100 Mbit/s Ethernet hub
    c. 10 stations connected to a 10 Mbit/s Ethernet switch

5. Host A wants to send an IP datagram (source: 10.0.0.1, destination: 10.0.0.5) to Host B via a router (MAC: RR:RR:RR:RR:RR:RR).

    ○ Construct the Ethernet frame headers for:

    a. The frame from Host A to the router.

    b. The frame from the router to Host B.

    ○ Why is the MAC source address different in the two frames?