1. A bit stream of 11001101 is transmitted using a standard CRC method. The generator polynomial is x^3+1. Show the actual bit string transmitted. Suppose the fourth bit from left is inverted during the transmission. Show how the error is detected at receiver's end.

Solution.

Given   CRC polynomial $= x^3 +1$
Bit stream to be transmitted $= 11001101$

```
1001) 1100 1101 000 (11010111
      -1001↓ |  |    |   |
       1011  |  |    |   |
      -1001↓ |  |    |   |
       0101  |  |    |   |
      - 0000↓ |    |   |
        1010  |    |   |
       -1001↓ |    |   |
        0111  |    |   |
       - 0000 ↓   |   |
         1110      |   |
        -1001  ↓   |
         1110      |
         1001↓
         1110
        - 1001
          111
```

∴ CRC = 111

```
1001) 1100 1101111 (11010111
      -1001↓
       1011
      -1001 ↓
        0101
       -0000 ↓
         1010
        -1001      ↓
           0111
          -0000      ↓
            1111
            1001           ↓
             1101
            -1001            ↓
              1001
              1001
               000
```

2.

2ⁿᵈ Case

```
      1001) 1101 1101 111(11000101
            -1001↓
             1001
             1001↓
             0001
            -0000↓
             0010
            -0000↓
             0101
            =0000↓
             1011
            -1001 ↓
             0101
            - 0000↓
             1011
            -1001
             010
```

Error - 0101

2. Suppose the following block of 16 bit is sent using a checksum of 8 bits 10010100 00110001. Compute the checksum and verify the transmission without any error. Suppose LSB of first segment is inverted. Show how the error is detected at the receiver's end.

Solution.

~~Given~~.
· Here, block of 16 bit is sent using checks of 8 bits

10010100 00110001

Step 1.

  Adding two 8 bits number

    1 0 0 1 0 1 0 0
  + 0 0 1 1 0 0 0 1
  ‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾
    1 1 0 0 0 1 0 1

  1's complement of 11000101 is

Checksum = 0 0 1 1 1 0 1 0

∴ The Pattern sent is by receiver is

    10010100 00110001 00111010

Step 2 :
  The data received by receiver is obtained
by adding checksum with 8 bits two 8 bits
data

    1 0 0 1 0 1 0 0
    0 0 1 1 0 0 0 1
  + 0 0 1 1 1 0 1 0
  ‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾

    1 1 1 1 1 1 1 1

∴ The 1's complement of above result is 00000000

∴ Therefore no error is detected at receiver's end.