HW1 109550087 [illegible]

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1. $p^i = \text{rem}\left[\frac{x^{n-k+i-1}}{g(x)}\right]$

$$G = \left[\begin{array}{cccc|ccc} 1 & 0 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 0 & 1 \end{array}\right] \quad H = \left[\begin{array}{cccc|ccc} 1 & 0 & 1 & 1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 & 1 \end{array}\right]$$

$I_k \quad P \qquad\qquad P^T \quad I_{n-k}$

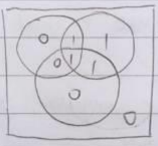
$$H = \begin{bmatrix} 1 & 0 & 1 & 1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 & 1 \end{bmatrix} \quad c = [0\,1\,1\,1\,0\,0\,1]$$

$r = [0\,0\,1\,1\,0\,0\,1]$

$s = [0\,1\,1] \quad e = [0\,1\,0\,0\,0\,0\,1] \Rightarrow r \oplus e = [0\,1\,1\,1\,0\,0\,1]$

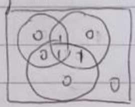
2. (a) $1 \oplus 2 \oplus 3 \oplus 4 \oplus 5 \oplus 6 \oplus 7$

(b)



If only one bit is incorrect, the receiver can which bit is in error and correct it by checking parity bits.
(8,4) can do single-bit correction and 2-bit error detection

say 11010100 → 11000000 (received



bit 6 incurs an error

after correct ⇒ 11000100

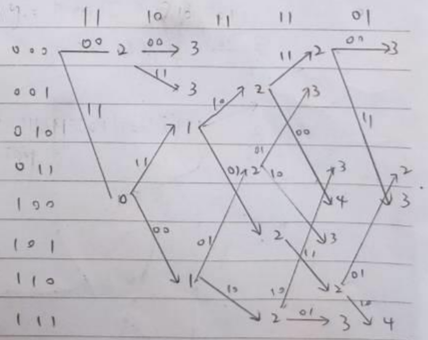
① check parity bits
② calculate syndrome vector
③ find the position of error
④ correct it

3. (a)

input	D_1	D_2	D_3	y_1	y_2
1	0	0	0	1	1
0	1	0	0	1	1
1	0	1	0	0	1
0	1	0	1	0	0
1	0	1	0	0	1

11 11 01 00 01
first

(b)



⇒ 1 0 1 1 0

input = 10110

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(c) x 1 0 1 1 0

y 11 11 01 11 01 error rate = $\frac{2}{10} = \frac{1}{5}$

received 11 10 11 11 01

4.

```
      10110110
   ---------------
11001 | 11100 11000000
        11001
        -----
          10111
          11001
          -----
           11100
           11001
           -----
            10100
            11001
            -----
             11010
             11001
             -----
               110
```

$\Rightarrow$ 110

5. a low-error-rate environment, because GBN doesn't require as much overhead as SR.

congestion network, if a network is suffering from congestion, GBN is more effective since it sends fewer packets at a time.

SEASON