Introduction to Coding Theory Assignment 4

Divij Singh

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1 Q1

(a) C is not a linear code, with $d(C) = 1$
(b)
The generator matrix will be a one row matrix of length N, with each value being 1.
So, if $N = 3$
G =

$$\begin{bmatrix} 1 & 1 & 1 \end{bmatrix}$$

and since $G = [I_k| - A^{tr}]$ we get P =

$$\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix}$$

(c)
For this, the Generator matrix will have N columns, and N-1 rows.
Thus for N = 4 G =

$$\begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \end{bmatrix}$$

and the parity check matrix P =

$$\begin{bmatrix} 1 & 1 & 1 & 1 \end{bmatrix}$$

2 Q2

(a)
$00 \to 0000$
$01 \to 0121$
$02 \to 0212$
$10 \to 1011$
$11 \to 1110$
$12 \to 1201$
$20 \to 2011$

$21 \to 2102$
$22 \to 2220$
$d(C) = 3$

(b) It is a linear code, with $d(C) = 4$