

ECE 575 HW #3

1) Given generator matrix of a linear code as

$$G = \begin{pmatrix} 0 & 1 & 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 1 & 0 & 1 \\ 1 & 1 & 1 & 1 & 0 & 0 & 0 \end{pmatrix}_{3 \times 7}$$

- Put G into systematic form
- Find H (parity check matrix)
- Find all the codewords
- Find minimum distance, error correction and detection capability
- Obtain standard array
- Obtain syndrome table
- Encode the dataword $d_0 = (101)$ and let c_0 be the codeword, introduce one-bit error pattern $e_0 = (1000000)$
- $r_0 = c_0 + e_0$, decode r_0
- Can more than 1-bit error be corrected
If yes give an example using syndrome table

2) The generator polynomial of a cyclic code

is given as $g(x) = x^3 + x + 1$

Let $n=7$, find the value of k

For (n, k) code

- Construct syndrome polynomial table
- Find generator matrix using $g(x)$
- Find parity-check matrix
- Define a dataword and systematically

encode
it using
 $g(x)$