ECS 452: In-Class Exercise # 12.2

Instructions

1. Separate into groups of no more than three persons. **The group cannot be the same as any of your former groups after the midterm.**
2. **Write down all the steps** that you have done to obtain your answers. You may not get full credit even when your answer is correct without showing how you get your answer.
3. **Do not panic.**

Date: 30 / 03 / 2018			
Name	ID (last 3 digits)		
Prapun	**5**	**5**	**5**

Consider a block code whose generator matrix is

$$\mathbf{G} = \begin{pmatrix} 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{pmatrix}$$

1. Find the code length n

   The #columns of G is 6

2. Find the length k of each message block

   The #rows of G is 3

3. In the table below, list all possible data (message) vectors **b** in the leftmost column (one in each row). Then, find the corresponding codewords **x** and their weights in the second and third columns, respectively.

b	**x**	$w(\mathbf{x})$
000	000000	0
001	001110	3
010	010011	3
011	011101	4
100	100101	3
101	101011	4
110	110110	4
111	111000	3

copy

$\underline{x} = \underline{b}G = [b_1\ b_2\ b_3]G$

$= [b_1\ b_2\ b_3\ \ b_1 \oplus b_3\ \ b_2 \oplus b_3\ \ b_1 \oplus b_2]$

simply copy the bits from $\underline{b}$

The 4th column of G is $[1\ 0\ 1]^T$. Therefore, the 4th element of $\underline{x}$ is the sum of the 1st and 3rd elements of $\underline{b}$.

The 5th column of G is $[0\ 1\ 1]^T$. Therefore, the 5th element of $\underline{x}$ is the sum of the 2nd and 3rd elements of $\underline{b}$.

The 6th column of G is $[1\ 1\ 0]^T$. Therefore, the 6th element of $\underline{x}$ is the sum of the 1st and 2nd elements of $\underline{b}$.

4. Find the minimum distance $d_{\min}$ for this code.

min

3