NAME ?

5/6

ECS 452: Digital Communication Systems	2015/2
HW 6 — Due: Apr 20	
Lecturer: Asst. Prof. Dr. Prapun Suksompong	

Instructions

(a) Solve all non-optional problems. (5 pt)

(i) Write your first name and the last three digit of your student ID on the upper-right corner of ***every*** submitted page.

(ii) For each part, write your explanation/derivation and answer **in the space provided.**

(b) ONE part of a question will be graded (5 pt). Of course, you do not know which part will be selected; so you should work on all of them.

(c) Late submission will be rejected.

(d) **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.

Problem 1. Consider a block code whose generator matrix is

$$\mathbf{G} = \left[\begin{array}{cccccc} 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{array}\right]$$

(a) Suppose the message is $\underline{\mathbf{b}} = [1\,0\,1]$. Find the corresponding codeword $\underline{\mathbf{x}}$.

$\underline{x} = \underline{b}G = [1\ 0\ 1]\left[\begin{array}{ccc|ccc} 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{array}\right] = [1\ 0\ 1\ 0\ 1\ 1]$

(b) In the provided table, list all possible data (message) vectors $\underline{\mathbf{b}}$ in the left column (one in each row). Then, find the corresponding codewords $\underline{\mathbf{x}}$ and their weights in the second and third columns, respectively.