## ECS 452: In-Class Exercise #14

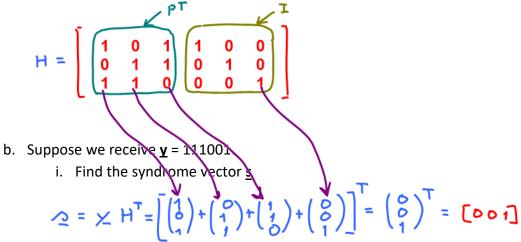
## Instructions

- 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.
- 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.

Consider a block code whose generator matrix is

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

a. Find the parity check matrix **H** of this code.



ii. Find the decoded codeword  $\hat{\mathbf{x}}$ 

The syndrome  $\Delta$  is the same as the last column of H. Therefore,  $\hat{\underline{e}} = [0 \ 0 \ 0 \ 0 \ 0]$  and  $\hat{\underline{x}} = \hat{\underline{\chi}} - \hat{\underline{e}} = \hat{\underline{\chi}} \oplus \hat{\underline{e}} = [111 \ 000]$ iii. Find the decoded message  $\hat{\underline{b}}$ .  $\hat{\underline{b}} = [11]$ From  $\underline{b}$ , we have  $\underline{I}_{3}$ in the front, so the message  $\underline{b}$  will be the first three bits of the codeword  $\underline{x}$ .

Date: <b>10</b> / <b>04</b> / 2018				
Name	ID	ID (last 3 digits)		
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