

MAT 148, Winter 2016

Homework Assignment 3

Due before the start of the class on Monday, January 25

Please read the sections 2.1-2.2 of the textbook before starting on the problem set.

Written Assignment (see p. 36-37):

4. Consider the $[6,3]$ code with the generator matrix:

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

Find all the cosets, their syndromes and minimal weights in each coset.

9. Is there a $[12,7,5]$ binary code (that is, $n = 12, k = 7$ and the minimal distance between codewords is 5)?

13. Prove that any binary $[23,12,7]$ code is perfect. How many errors can it correct?

B. Decode the message $y = 1001001$, which was encoded using the $[7,4]$ Hamming code with the generator matrix

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

and at most one bit was changed.

The homework must be legible, and written in connected sentences that explains what you are doing. Just the answer (whether correct or not) is not enough. Please put your name and section number on every page and staple the pages together. Homework should be handed in on time, late homework will not be graded.