Homework 1
Algebraic Coding Theory
Math 525
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Problem 1:

1. {Exercise 1.2.1} "Find all words of length 3, 4, and 5"

   $C_3 = \{000, 001, 010, 100, 011, 110, 101, 111\}$
   $C_4 = \{0000, 1000, 0100, 0010, 0001, 1100, 1010, 1001, 0110, 0101, 0011, 1110, 1101, 1011, 0111, 1111\}$
   $C_5 = \{00000, ..., 11111\}$

2. {Exercise 1.2.2} "Find a formula for the total number of words of length n"

   For codeword length, n, a code C_n will have a total of 2^n codewords.

3. {Exercise 1.2.3} "Let C be the code consisting of all words of length 6 having an even number of ones. List the codewords in C"

$$\{...\}$$

Problem 2:

1. {Exercise 1.3.4} "Let C be the code of all words of length 3. Determine which codeword was most likely sent if 001 is received."

$$\{001\}$$

2. {Exercise 1.3.5} "Add a parity check digit to the codewords in the code in Exercise 1.3.4, and use the resulting code C to answer the following questions"

   (a) "If 1101 is received can we detect an error?"

   Yes because the amount of 1's need to be even

   (b) "If 1101 is received what codewords were most likely to have been transmitted?"

   $$\{1100, 0101, 1001, 1111\}$$

   (c) "Is any word of length 4 that is not in the code, closest to a unique codeword?"

   No because each word, has 4 closest codewords to each other.

Problem 3: