EE/Ma 127a Error-Correcting Codes — R. J. McEliece
draft of November 15, 2000 — 162 Moore

Homework Assignment 6 (**Final Version**)
Due (in class) 9am November 17, 2000

Reading: Wicker, Section 5.3, pp. 121–127
Handout: "Chapter 8: Cyclic Codes," pp. 27–31.

Problems to Hand In:

Problem 1. Handout "Chapter 8: Cyclic codes," Problem 8.70.

Problem 2. Wicker,, Problem 5.9 (p. 128). (Note that the code C_1 is defined before Problem 1 on p. 127.)

Problem 3. In class on Wednesday Nov. 15, I proposed defining a parity-check matrix for a n=15 double error-correcting code of the form

$$H = \begin{pmatrix} 1 & 2 & 3 & \cdots D & E & F \\ f(1) & f(2) & f(3) & \cdots f(D) & f(E) & f(F) \end{pmatrix}$$

where f is a function mapping four-bit vectors to four-bit vectors. I showed that if $f(x) = Tx$, where T is a linear transformation, this construction doesn't work. In this problem , you are to consider an *affine* transformation, i.e., one of the form $f(x) = Tx + y$, where T is a linear transformation, and y is a nonzero vector.

(a) What is the minimum distance of the resulting code?

(b) What is the dimension of the resulting code?