EE/Ma 127b Error-Correcting Codes — R. J. McEliece
draft of January 12, 2001 — 162 Moore

Homework Assignment 1—**Final Version**
Due (in class) 9am January 17, 2001

Reading: Wicker, Chapter 2, Section 2.2, pp. 34–39.
RJM Finite Field notes, Chapter 5, pp. 29–34

Problems to Hand In:

Problem 1. In class om January 3, I demonstrated that [0100] is a primitive element in $GF(16)$, if the field is defined by the polynomial $x^4 + x + 1$. Suppose, however, that the field is defined by the irreducible polynomial $x^4 + x^3 + x^2 + x + 1$.

(a) What is the order of [0100] now?

(b) Find an element of order 15.

Problem 2. RJM Finite Field notes, Problem 5.7. page 51.

Problem 3. Complete the table on p. 49 of the RJM Finite field notes.

Problem 4. RJM "Chapter 9" notes, Problem 9.6, p. 39.

Problem 5. In class on January 12 I proved that the $n = 23$, $t = 1$ BCH code had dimension 12 and minumum distance at least 5. (I also stated without proof that the actual minimum distance is 7.) Using similar reasoning, investigate the $t = 1$ BCH codes for all odd values of n in the range $7 \leq n \leq 31$.

(a) In each case, what is the code dimension?

(b) In each case, say as much as you can about the minimum distance.