

Math 350
Spring, 2000

HOMEWORK #9

Do 50 points of the following problems (due 4/11/00).

- 25 pts. **1** Suppose we want to construct a Huffman code on the 5 letters A(50), E(100), H(20), R(40), and T(45), where the numbers in parenthesis represent the frequency of these letters in a test text. Construct the Huffman code, and decode the following three words: 11010010100; 1000111101110; 1101001010111110. You can use <http://swww.ee.uwa.edu.au/plsd210/ds/huffman.html> to remind yourself of how the code is constructed.
- ★ 25 pts. **2** Start with the field with 8 elements in it, the Goppa polynomial $G(x) = x^2 + x + 1$, and the subset $L = \{0, 1, \alpha, \alpha^2, \alpha^3 = \alpha + 1, \alpha^4 = \alpha^2 + \alpha, \alpha^5 = \alpha^2 + \alpha + 1; \alpha^6 = \alpha^2 + 1\}$. Construct the Goppa code of length 8 based on this set-up, and describe the properties of this code. You can find copies of Mohammed's slides at <http://www.mathcs.richmond.edu/jad/350s00/Mohammedpresentation.pdf>.
- 25 pts. **3** Define the four quadratic residue codes of length 17, and explain what properties they have.