

CMSC 442 Fall 2001
Instructor: Dr. Lomonaco
Homework 5

- **READING ASSIGNMENT:** Peterson & Weldon, “**Error-Correcting Codes,**” MIT Press, (Second Edition), (1986), Chapter 6 & 8
- **OPTIONAL READING ASSIGNMENT:** MacWilliams & Sloane, “**The Theory of Error-Correcting Codes,**” North-Holland (Second Edition), (1983), Chapter 7.

Problem 1. Compute by hand $\gcd(g(x), h(x))$ over $GF(2)[x]$, where

$$g(x) = x^{12} + x^9 + x^8 + x^6 + x^4 + x + 1$$

and

$$h(x) = x^{11} + x^{10} + x^6 + x^5 + x^4 + x^3 + 1.$$

Then compute with MAPLE $\gcd(g(x), h(x))$ over $\mathbb{Q}[x]$ and over $GF(2)[x]$, where \mathbb{Q} denotes the field of rational numbers.

Problem 2. Let V denote the cyclic code of length 15 in $R_{15} = GF(2)[x] / \langle x^{15} + 1 \rangle$ given by the generator polynomial:

$$g(x) = x^8 + x^4 + x^2 + x + 1.$$

Use $g(x)$ to compute the generator matrix G of V . What is the dimension of V ?