

Information and Coding Theory

ENEE 5304

Problem Set 4

Cyclic Redundancy Check Codes

1. Consider the (7, 4) CRC code with a generator polynomial:

$$g_1(x) = x^3 + x + 1$$

- Find the codeword corresponding to the message (1011)
- Can this polynomial detect the error pattern (0000101)?
- Can this polynomial detect the error burst (0011100)?
- What is maximum size of the burst error that this code can detect?

2. Consider the (7, 4) CRC code with a generator polynomial:

$$g_2(x) = x^3 + x^2 + 1$$

- Find the codeword corresponding to the message (1011)
- Can this polynomial detect the error pattern (0000101)?
- Can this polynomial detect the error burst (0011100)?
- What is maximum size of the burst error that this code can detect?

3. Find the product of $g_1(x)g_2(x)$

4. Consider a CRC code with a generator polynomial:

$$g(x) = x^4 + x + 1$$

- Find the maximum length of the codeword generated by this polynomial?
- Can this code detect single error patterns?
- Can this code detect double error patterns?
- What is maximum size of the burst error that this code can detect?

5. Consider a CRC code with a generator polynomial:

$$g(x) = x^5 + x^3 + 1$$

- What are the error detection capabilities of this polynomial?
- Find the maximum size of a frame such that the error detection capabilities of Part a can be exploited?