

SC461- Coding Theory and Applications

Home Work 4

Fall 2019

(1) Identify the cyclic codes from the give list:

a) { 0000,1100,0110,0110,0011,1001} The Binary Code

b) {00000, 10110,01101,11011} The Binary Code

c) {000,1122,2211} The Ternary Code

Does any one from the above list is equivalent to a cyclic code?

(2) Suppose C is a binary linear code of length n which contains the vector $111 \dots 11$ consisting of all 1s. Show that $A_i = A_{n-i}, i = 0, 1, \dots n$.

(3) What is the ideal describing the cyclic code {0000, 0101, 1010, 1111}?

(4) Factorize $x^5 - 1$ into irreducible polynomials over \mathbb{Z}_2 and hence determine all the cyclic binary codes of length 5.

(5) Show that the $[7, 4, 3]$ code with $g(x) = x^3 + x + 1$ and the $[7, 3, 4]$ code with $g(x) = x^4 + x^3 + x^2 + 1$ are duals.