**Homework for section#5A (approximate due date Sept 14th, 2020)**

1-Arithmetic in extended Galois field with ;  ***= + + + + 1***

**Compute the following elements**:

1/21; 1/9f; 1/ab; 1/cd

1/21 = 6e

1/9f = 9a

1/ab = 4a

1/cd = fc

2-Arithmetic in extended Galois Field with *;*  ***= + + 1***

Represented by polynomials:  *= + +*

Elements: *(****0****,* ***1****, ,* ***+1****, ,* ***+1****,* ***+*** *,* ***+ +1****)*

Find the 8 inverses:

Multiplication Table

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 000 (0) | 001 (1) | 010 (x) | 011 (x+1) | 100 () | 101 (+1) | 110 (+x) | 111 (+x+1) |
| 000 (0) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 001 (1) | 0 | **1** |  |  |  |  |  | +1 |
| 010 (x) | 0 |  |  |  |  | **1** | +1 |  |
| 011 (x+1) | 0 |  |  |  | +1 |  | **1** |  |
| 100 () | 0 |  |  | +1 |  |  |  | **1** |
| 101 (+1) | 0 |  | **1** |  |  | +1 |  |  |
| 110 (+x) | 0 |  | +1 | **1** |  |  |  |  |
| 111 (+x+1) | 0 | +1 |  |  | **1** |  |  |  |

Inverse Table

|  |  |
| --- | --- |
|  |  |
| 1 | 1 |
| x | +1 |
| x+1 | +x |
|  | +x+1 |
| +1 | x |
| +x | x+1 |
| +x+1 |  |

**Compute the following:**

**+1 ⨸ + =?**

= ( +1) \* (x + 1) [ Inverse of + is x +1]

= + + x + 1

Now, + + x + 1 mod ( + +1)

+ + x + 1 = ( + +1) \* 1 +

Remainder =

+ + x + 1 mod ( + +1)

+1 ⨸ + = 101 ⨸ 110 = 100

**+ ⨸ +1 =?**

(+ [Inverse of +1 is x]

= +

Now, + mod ( + +1)

+ = ( + +1) \* 1 + ( - x - 1)

Remainder ( - x - 1)

+ ( - x - 1) mod ( + +1)

( + x + 1) mod ( + +1)

= 110 ⨸ 101 = 001