Homework3

INF 638

Jun Rao (jr2339@nau.edu)

Extend Galois field with

Ex: are represented by polynomials: A(x) = + +

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

1.Prepare the multiplication table, the irreducible polynomial is P(x) = + + 1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 000(0) | 001(1) | 010(2) | 011(3) | 100(4) | 101(5) | 110(6) | 111(7) |
| 000 (0) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 001 (1) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 010 (2) | 0 | 2 | 4 | 6 | 3 | 1 | 7 | 5 |
| 011(3) | 0 | 3 | 6 | 5 | 7 | 4 | 1 | 2 |
| 100 (4) | 0 | 4 | 3 | 7 | 6 | 2 | 5 | 1 |
| 101(5) | 0 | 5 | 1 | 4 | 2 | 7 | 3 | 6 |
| 110(6) | 0 | 6 | 7 | 1 | 5 | 3 | 2 | 4 |
| 111(7) | 0 | 7 | 5 | 2 | 1 | 6 | 4 | 3 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 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** |  |  |  |

2.Find the inverses

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