CEIS 210

Week 4 Lab

1 . Develop a set of tables similar to Table 5.3 from the textbook for GF(4) with Modulo *(x2 + x + 1).*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 0 | X | X | X+1 |
| 0 | 0 | X | X | X+1 |
| 1 | 1 | 0 | X+1 | X |
| X | X | X | 0 | 1 |
| X+1 | X+1 | x | 1 | 0 |

*Addition*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 0 | 1 | x | X+1 |
| 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | x | X+1 |
| x | 0 | x | X+1 | 1 |
| X+1 | 0 | X+1 | 1 | x |

*Multiplication*

2. Determine the multiplicative inverse of (*x3 + x + 1*) in GF(2﻿4﻿) with *m(x) = x﻿4﻿ + x + 1.*

(x³ + x + 1)(x² + 1) = x⁵ + (1 + 1)x³ + x² + x + 1

x⁵ + x² + x + 1 = x(x⁴ + x + 1) + 1 = 1

3. Develop a table similar to Table 5.5 from the textbook for GF(2﻿4﻿) with *m(x) = x﻿4﻿ + x + 1.*

|  |  |  |  |
| --- | --- | --- | --- |
| Power representation | Polynomial representation | Binary representation | Decimal (hex) representation |
| 0 | 0 | 000 | 0 |
| g0(=g7) | 1 | 001 | 1 |
| G1 | g | 010 | 2 |
| G2 | G2 | 100 | 4 |
| G3 | G+1 | 011 | 3 |
| G4 | G2+g | 110 | 6 |
| G5 | G2+g+1 | 111 | 7 |
| G6 | G2+1 | 101 | 5 |