Cheat Sheet GF(4)

January 16, 2021

polynomial:
$$X^2 + X + 1 = 7$$

 $Z_i = \log_{\alpha}(1 + \alpha^i)$

1	γ_i	$-\gamma_i$	γ_i^{-1}	$\log_{\alpha}(\gamma_i)$	α^i	Z_i	$\phi(\gamma_i)$	$T(\gamma_i)$	$N(\gamma_i)$
(0 = 0	0	DNE	DNE	1	DNE	0	0	0
1	1 = 1	1	1	3	2	2	1	0	1
2		2	3	1	3	1	3	1	1
:	$\alpha + 1 = \omega^2$	3	2	2	1	DNE	2	1	1

+	0	1	2	3
0	0	1	2	3
1	1	0	3	2
2	2	3	0	1
3	3	2	1	0

$$2^3 = 1$$

$$2^{0} = 1$$
 $2^{1} = 2$
 $2^{2} = 3$

i	γ_i	$-\gamma_i$	γ_i^{-1}	$\log_{\alpha}(\gamma_i)$	α^i	Z_i	$\phi(\gamma_i)$	$T(\gamma_i)$	$N(\gamma_i)$
0	0 = 0	0	DNE	DNE	1	DNE	0	0	0
1	1 = 1	1	1	3	2	2	1	0	1
2	$\alpha = \omega$	2	3	1	3	1	3	1	1
3	$\alpha + 1 = \omega^2$	3	2	2	1	DNE	2	1	1

+	0	1	2	3
0	0	1	2	3
1	1	0	3	2
$\begin{vmatrix} 1\\2\\3 \end{vmatrix}$	1 2 3	3	0	1
3	3	2	1	0

•	1	2	3
1	1	2	3
2	2	3	1
3	3	1	2

 $2^{0} = 1$ $2^{1} = 2$ $2^{2} = 3$

 $2^3 = 1$