Writing the elements in lexicographical order :

$$0 + 0.x,\ 0 + 1.x,\ 0 + 2.x$$
$$1 + 0.x,\ 1 + 1.x,\ 1 + 2.x$$
$$2 + 0.x,\ 2 + 1.x,\ 2 + 2.x$$

$\mathbb{F}_3C_2 = \{0, 1, 2, x, 2x, 1 + x, 1 + 2x, 2 + x, 2 + 2x\}$.

$$\varepsilon : \mathbb{F}_3C_2 \longrightarrow \mathbb{F}_3$$

$\varepsilon(\alpha)$	$\alpha \in \mathbb{F}_3C_2$
0	$\{0, 2 + x, 1 + 2x\}$
1	$\{1, x, 2 + 2x\}$
2	$\{2, 2x, 1 + x\}$

$\mathcal{U}(\mathbb{F}_3C_2) = \{1, x, 2, 2x\}$, since $1^2 = 1$, , $x^2 = 1$, $2^2 = 1$ and $(2x)^2 = 1$. In a group inverses are unique, so we don't need to multiply these anymore. $\mathcal{U}(\mathbb{F}_3C_2) \cong C_2 \times C_2$ since it has no elements of order 4, so $\mathcal{U}(\mathbb{F}_3C_2) \not\cong C_4$.

$(1 + x)(1 + x) = 1 + x + x + x^2 = 2 + 2x \neq 1$. $(1 + x)(2 + x) = 2 + x + 2x + x^2 = 0 \neq 1$. Note that these are zero divisors so they are not units. Also $(1 + 2x)(1 + 2x) = 1 + 2x + 2x + 4x^2 = 2 + x$ and $(1 + 2x)(2 + 2x) = 2 + 2x + 4x + 4x^2 = 0$.

$$\therefore \mathcal{ZD}(\mathbb{F}_3C_2)\{1 + x, 2 + x, 1 + 2x, 2 + 2x\}$$

Note $\mathbb{F}_3C_2) = \mathcal{U}(\mathbb{F}_3C_2) \cup \mathcal{ZD}(\mathbb{F}_3C_2) \cup \{0\}$.

Conjecture 2.4 *In general in any group ring RG, do we have*

$$\mathbb{F}_3C_2) = \mathcal{U}(\mathbb{F}_3C_2) \cup \mathcal{ZD}(\mathbb{F}_3C_2) \cup \{0\}$$

Lemma 2.5 *Let I be an ideal of a ring R, with $I \neq R$. Then I contains no invertible elements.*