Date: __/__/20

Q1: Show that $Z_{12}/\{0,4,8\} \cong Z_4$

$$Z_{12}/I \approx Z_4$$

$$I = \{0,4,8\}$$

We defined a mapping

$$\psi : Z_{12} \to Z_4$$

$Z_4 = \{0,1,2,3\}$

$$\psi(\bar{0}) = 0 = \psi(\bar{4}) = \psi(\bar{8})$$

$$\psi(\bar{1}) = 1 = \psi(\bar{5}) = \psi(\bar{9})$$

$$\psi(\bar{2}) = 2 = \psi(\bar{6}) = \psi(\bar{10})$$

$$\psi(\bar{3}) = 3 = \psi(\bar{7}) = \psi(\bar{11})$$

Now we show ψ is Ring Homo, Onto.
and $\ker\psi = I = \{\bar{0},\bar{4},\bar{8}\}$

i) To show ψ is a Ring **Homophism**

$$\psi(a +_{12} b) = \psi(a) +_{4} \psi(b)$$

$$\psi(a \cdot_{12} b) = \psi(a) \cdot_{4} \psi(b)$$

Let $a = \bar{1} \in Z_{12}$ $\quad b = \bar{2} \in Z_{12}$

$$\psi(a+b) = \psi(\bar{1}+\bar{2})$$

$$= \psi(\bar{3})$$

$$= 3$$

$$\psi(a) + \psi(b) = \psi(1) + \psi(2)$$

$$= \bar{1} + \bar{2} \quad = 3$$