$\phi_3 : (\mathbb{Z}^*_7, \times_7) \to (\mathbb{Z}_6, +_6)$

$1 \to 0$

$2 \to 2$

$3 \to 1$

$4 \to 4$

$5 \to 5$

$6 \to 3$

This is an isomophism, from the Cayley tables constructed to show that it was a homomorphism. In fact, since it is an isomorphism, it is also a homomorphism, with the mapping of one element to another as shown

$\phi_4 : (M, +) \to (\mathbb{R}, +)$

$A \to tr(A)$

where $tr\begin{pmatrix} a & c \\ b & d \end{pmatrix} = a + d$

$Ker(\phi_4) = \left\{ \begin{pmatrix} a & c \\ b & -a \end{pmatrix} : a \in \mathbb{R} \right\}$

This homomorphism is onto, so

$M / Ker(\phi_4) \cong \mathbb{R}$

ie the quotient group is isomorphic to $\mathbb{R}$

6/8

$\frac{17\frac{1}{2}}{25}$