

Warm up HW1 , Math 530, Fall 2014

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QUESTION 1. (i) Let $G = Z_5^*(+)Z_5$. For $(a, b), (c, d) \in R$, define $(a, b) * (c, d) = (ac, bc + ad)$, where "+" indicates addition module 5 and "ac, bc, ad" indicates multiplication module 5. For example $(2, 4) * (3, 1) = (1, 4)$. It is easy to check that $(D, *)$ is associative and it is closed (Dont show that). Prove that $(D, *)$ is a group. What is the identity of D ? Find the inverse of $(3, 3), (4, 0)$? Give me one subgroup of G , say H , such that H contains 2 elements.

(ii) Let $G = \left\{ \begin{bmatrix} a & b \\ -b & a \end{bmatrix} \mid a, b \in \mathbb{Q} \right\}$. Show that (G^*, \cdot) is an abelian group, where \cdot indicates matrix multiplication.
(note G^* indicates the nonzero matrices in G .)

(iii)

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