

Math 2326 - Introduction to Abstract Mathematics
Assignment 25 - Due Friday, March 28

Problem 86: Let G be a group and let $a \in G$. Define $\phi_a : G \rightarrow G$ by $\phi_a(x) = axa^{-1}$. Show that ϕ_a is an automorphism.

Problem 87: Let G_1 and G_2 be groups and suppose that $\phi : G_1 \rightarrow G_2$ is an isomorphism.

- a. Show that for every $a \in G$, $|a| = |\phi(a)|$.
- b. Use part (a.) to show that if G_2 is cyclic then G_1 is cyclic. (This exercise was referred to in class.)

Problem 88: Let $\mathbb{C} = \{a + ib \mid a, b \in \mathbb{R}\}$ denote the set of complex numbers under addition, and define $\rho : \mathbb{C} \rightarrow \mathbb{C}$ by $\rho(a + ib) = a - ib$.

- a. Show that ρ is an automorphism.
- b. Describe the action of ρ geometrically.