Exercise 72. Let $G$ be an abelian group and let $a, b \in G$. Prove that $(ab)^n = a^n b^n$ for all $n \in \mathbb{N}$. [Hint: Use induction.]

Exercise 73. Let $H = \{ g : \mathbb{R} \to \mathbb{R} \mid g(x) = ax + b \text{ with } a, b \in \mathbb{R} \text{ and } a \neq 0 \}$.

a. Prove that $H \subseteq \text{Aut}(\mathbb{R})$.

b. Prove that $H$ is a subgroup of $\text{Aut}(\mathbb{R})$. [Note: Remember that the operation in $\text{Aut}(\mathbb{R})$ is composition.]

Exercise 74. Let $H$ and $K$ be subgroups of a group $G$. Prove that $H \cap K$ is also a subgroup of $G$. 