INTRO TO ABSTRACT MATH
FALL 2009

HOMEWORK 25
DUE NOVEMBER 13

**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 $H \subseteq \mathrm{Aut}(\mathbb{R})$.

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

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