1. Let $h$ be a homomorphism of $A$ into $B$, and let $s$ map the set of variables into $\text{dom}(A)$. Prove that for any term $t$, we have $h(s(t)) = h \circ s(t)$, where $s$ is computed in $A$, and $h \circ s(t)$ is computed in $B$ (this is the first part of the Homomorphism Theorem).

2. Show that the multiplication relation, $\{ ⟨m, n, p⟩ \mid p = m \cdot n \}$, is not definable in $(\mathbb{Z}; +)$ (integers with the standard definition of $+$).

3. Prove that $(\mathbb{N}; +)$ is rigid. (A model is rigid if its only automorphism is the identity function).