1. (2 points) Let $G$ be a nonempty set and let $*$ be an associative binary operation on $G$. Assume that for any elements $a, b \in G$, we can find $x \in G$ such that $a * x = b$, and we can find $y \in G$ such that $y * a = b$. Prove that $(G, *)$ is a group.

2. (2 points) Let $G$ be a group. Let $a, b \in G$. Prove that $o(ab) = o(ba)$.

3. (2 points) Prove that if $G$ is a finite group, then every element of $G$ is of finite order.

4. (2 points) Determine $(561, 84)$. Find integers $m, n$ such that $561m + 84n = (561, 84)$.

5. (2 points) Let $G$ be a group. Let $x, y \in G$. Assume that $x \neq e$, $o(y) = 2$, and $yxy^{-1} = x^2$. Determine $o(x)$. 