Abstract Algebra 1
Quiz 4

Name:_____

You have 10 minutes to complete this quiz. If you have a question raise your hand and remain seated. In order to receive full credit your answer must be **complete**, **legible** and **correct**. Show your work, and give adequate explanations.

1. Let $D_n = \langle r, f \mid r^n = 1, f^2 = 1, fr = r^{-1}f \rangle$ be the dihedral group of order $2n$. Show that $(rf)^2 = 1$.

Using the group laws and some of the relations that define the dihedral group we calculate:

$$(rf)^2 = (rf)(rf) = r(fr)f = r(r^{-1}f)f = (rr^{-1})(ff) = 1 \cdot 1 = 1.$$

2. Assume that $h\colon A \to B$ is a homomorphism of groups. Assume that the codomain of h is abelian. Show that for any $a_1, a_2 \in A$ it is the case that $h(a_1 \cdot a_2) = h(a_2 \cdot a_1)$.

We are assuming that the B-multiplication is commutative, so we get the middle inequality in:

$$h(a_1 \overset{A}{\cdot} a_2) = h(a_1) \overset{B}{\cdot} h(a_2) = h(a_2) \overset{B}{\cdot} h(a_1) = h(a_2 \overset{A}{\cdot} a_1).$$