Math 411: Honors Algebra I
Practice Midterm
October 23, 2017

Emily Riehl

True or False

(1 point)	Indicate whether each of the following statements is true or false (circle one).
(2 points)	For each true statement, give a short (one to two sentence) justification, explaining the essential reason why the assertion is correct; for each false statement, provide either a counter-example or, in the case where a counter-example would not make sense, a short disproof.

1. (T or F) A bijective function $f\colon A \to B$ has a unique inverse function.

2. (T or F) A finite group can have elements of infinite order.

3. (T or F) The symmetric group S_4 has 256 elements.

4. (T or F) The Klein four group is abelian.

5. (T or F) The function $- + 10 \colon \mathbb{Z} \to \mathbb{Z}$, adding 10 to any integer, defines a group homomorphism.

6. (T or F) There exists a non-zero homomorphism $\mathbb{Z} \to S_6$.

7. (T or F) Every subgroup of $\mathbb{Z}$ is cyclic.

8. (T or F) Let $r_1 \in D_{10}$ denote the reflection through the axis of symmetry that bisects the 1st vertex of the pentagon. The subgroup generated by r_1 is a normal subgroup of D_{10}.

9. (T or F) For any non-zero group homomorphism $\phi\colon G \to H$ if $g_1, g_2 \in G$ are so that $g_1 \cdot g_2 = g_2 \cdot g_1$ in G, then $\phi(g_1) \cdot \phi(g_2) = \phi(g_2) \cdot \phi(g_1)$ in H.

10. (T or F) For any non-zero group homomorphism $\phi\colon G \to H$ if $g_1, g_2 \in G$ are so that $\phi(g_1) \cdot \phi(g_2) = \phi(g_2) \cdot \phi(g_1)$ in H, then $g_1 \cdot g_2 = g_2 \cdot g_1$ in G.