Name:

Problem 1 (4 points)**.** Circle all the true statements, no justification necessary.

(a) $S_3 \cong D_3$.

(b) S_4 has 8 elements.

(c) S_5 is an abelian group.

(d) $(1\,2\,3)$ is an odd permutation.

(e) $\mathbb{Z}_7^\times$ is a cyclic group.

(f) If G and H are groups of order 4, $G \cong H$.

Problem 2 (3 points)**.** Let $f : G \longrightarrow H$ be an injective group homomorphism. Show that for every $g \in G$, $|f(g)| = |g|$.

Problem 3 (3 points)**.** True or false: the function $\mathbb{Z}_9 \longrightarrow \mathbb{Z}_9$ given by $x \mapsto 2x$ is a group isomorphism.

Problem 4 (Bonus)**.** The subgroup of S_n formed by all even permutations is denoted A_n. Show that A_n is generated by all the 3-cycles.