1. Prove that a group in which every element except the identity has order 2 is abelian.

2. Let $H = \{\pm 1, \pm i\}$ be the subgroup of $G = \mathbb{C}^\times$ of fourth roots of unity. Prove that G/H is isomorphic to G. Hint: You may want to construct a surjective homomorphism from G to G whose kernel is H. You must show that your map is surjective and a homomorphism.

3. Let G and G' be finite groups whose orders have no common factor. Prove that the only homomorphism $\varphi : G \to G'$ is the trivial one $\varphi(x) = 1$ for all x.