Exercises 4: 3, 5, 6, 19, 29, 31, 32, 36, 37

Additional exercises:

1. Prove that the identity element of a group is unique. (This justifies the use of the special letter e for this element.)

2. Let G be a group and fix an element $g \in G$. Define a function $\phi_g \colon G \to G$ by $\phi_g(h) = ghg^{-1}$ for all $h \in G$.

   (a) Prove that ϕ_g is a bijection (i.e., injective and surjective).

   (b) Prove that $\phi_g(ab) = \phi_g(a)\phi_g(b)$ for all $a, b \in G$.