Exercise 1.

Exercise 2.

Exercise 3. Let $f : A \to A$ be an R-module homomorphism. Show that if $ff = f$, then $A \cong \ker f \oplus \operatorname{Im} f$.

Exercise 4. Let $f : A \to B$ and $g : B \to A$ be R-module homomorphisms. Show that if $gf = \mathrm{id}$, then $B \cong \operatorname{Im} f \oplus \ker g$.

Exercise 5.