Problem 1. A *monoid* is a list (A, m, e) where A is a set, $m : A \times A \to A$ is a function, and e is an element of A, satisfying the following conditions:

(i) For any $f \in A$, $g \in A$, and $h \in A$ we have

$$m(m(f, g), h) = m(f, m(g, h)),$$

and

(ii) for any f in A, we have

$$m(e, f) = m(f, e) = f.$$

Let S be a set and let A be the set of functions from S to itself. Define

$$m : A \times A \to A$$

by $m(f, g) = f \circ g$. Prove that (A, m, e) is a monoid.

Problem 2. Find at least one problem or concept that is confusing and ask a question about it. Try to find a problem that is relvant to sections §§3–7, 11, or 20. Make your question as specific as you can (try to pinpoint exactly what you find confusing).