1. Show that axiom 7 on page 41 is equivalent to the following statement. $7'$: if $nm = 0$ and $n \neq 0$, then $m = 0$.

2. Use the axioms on page 41 to prove that for every pair $m, n$, there is exactly one number $k$ such that $n + k = m$.

3. To the 7 axioms on page 41 could be added an eighth. $8$: if $m \neq 0$ then there is an $n$ such that $mn = 1$. Give an example of a set of numbers which satisfy axioms 1-7 but not axiom 8, then give an example of a set of numbers which satisfies all eight axioms.

4. Show that any finite set of numbers satisfying axioms 1-7 automatically satisfies axiom 8.

5. Let $X$ be a finite set and let $\mathcal{P}(X)$ be the powerset of $X$. Obviously $\mathcal{P}(X)$ is finite. Make a conjecture about the size of $\mathcal{P}(X)$ based on the size of $X$. Prove the conjecture if you are able to.