1. Apostol §I 3.3 (p. 19) 1 (do I.6–8), 3, 4*.

2. Apostol §I 3.5 (p. 21) 1 (do I.24*), 2, 5, 9, 10*.

3. If $f : S \to T$ and $g : T \to U$ are injective functions, prove that the composite $g \circ f$ is also injective.

*4. Suppose that $f : S \to T$ and $g : T \to S$ are functions such that $g \circ f = \text{id} : S \to S$. (In this case, we say that $g$ is a left inverse for $f$.) For each of the following, give a proof if true, or a counterexample if false. (a) $f$ is injective; (b) $f$ is surjective; (c) $g$ is injective; (d) $g$ is surjective.

*5. If $S \subseteq \mathbb{R}$ and $T \subseteq \mathbb{R}$ are inductive sets, prove that $S \cap T$ is too.

6. Prove that every positive integer is positive! That is, if $n$ is a positive integer, then $n > 0$.

*7. Prove that the product of two positive integers is a positive integer. Hint: induction. Prove that the product of two integers is an integer.