Problem 1. Use the Least Upper Bound Property of the real numbers to show that if $a \in \mathbb{R}$, then there is an integer $n \in \mathbb{N}$ such that $n > a$. This is known as Archimedes’ Principle.

Problem 2. Show that $\sum_{n=1}^{\infty} \frac{1}{n^2}$ converges.
Problem 3. Show that if $0 < x < 1$, then $\lim_{n \to \infty} x^n = 0$.

Problem 4. Let $C = \{ x = \sum_{n=1}^{\infty} \frac{a_n}{3^n} \mid a_n \in \{0, 2\}, \ n \in \mathbb{N} \}$ be the Cantor Set. Show that there is a continuous function $f : C \to [0, 1]$ which is onto.
Problem 5. Show that $\sum_{n=0}^{\infty} x^n = \frac{1}{1-x}$ for all $|x| < 1$. 