Problem 1. Prove that for every pair of positive integers a and b, their greatest common divisor is unique.

Problem 2. The $n \times n$ zero matrix $\mathbf{0}$ has the property that $\mathbf{A} + \mathbf{0} = \mathbf{A}$ for all $n \times n$ matrices $\mathbf{A}$. Prove that this is the unique $n \times n$ matrix with this property.

Problem 3. Prove that n^2 is odd if and only if $n^2 - 1$ is divisible by 8.

Problem 4. Prove that $x < y$ if and only if there exists $\epsilon > 0$ such that $x + \epsilon < y$. Then, explain why this implies that $0.999\ldots = 1$.