(1) Prove that if $\forall n \in \mathbb{N}[0 \leq x \leq \frac{1}{n}]$, then $x = 0$.

(2) Show that there does not exist a rational number $x$ such that $x^2 = 5$. 

(3) Suppose $x > 0$, $y > 0$, and $l < xy$. Show that there is some $n \in \mathbb{N}$ such that

$$l < (x - \frac{1}{n})(y - \frac{1}{n}).$$