Let $A \subset \mathbb{R}$ be bounded. If $\alpha \in \mathbb{R}$, define $\alpha + A = \{\alpha + x : x \in A\}$. Prove that $\sup(\alpha + A) = \alpha + \sup A$. 
504 Question 2 – AMS QUALIFYING EXAM – Spring, 2006

Let $E_n, n = 1, 2, \ldots$ be dense open sets in $\mathbb{R}^k$. Prove that $\cap_{n=1}^{\infty} E_n$ is dense in $\mathbb{R}^k$. 