1. Let K be a compact subset of $\mathbb{R}^n$. Prove given $\epsilon > 0$ that there is a C^∞ function $\rho_K(\cdot)$ on $\mathbb{R}^n$ such that

$$\rho_K(\mathbb{R}^n) \subset [0,1], \qquad \mathrm{supp}(\rho_K) \subset \{y \in \mathbb{R}^n : \mathrm{Dist}(y, K) < \epsilon\}, \qquad \text{and} \qquad \rho_K \equiv 1 \text{ on } K.$$