1. Suppose that $f : \mathbb{R}^n \to [-\infty, \infty]$ is $\mathcal{L}$-measurable. Define the support of $f$ by

$$x \in (\text{supp} f)^c$$

if and only if $f = 0$ in some neighborhood of $x$.

Prove that $\text{supp} f$ is closed. Prove that if $f$ is continuous, then this definition agrees with the one given in the lecture.

2. In dimension $n = 1$ produce a computer generated plot of the characteristic function $\chi_{[0,1]}$ convolved with $\phi_a(x)$ for $a = 1.5, 0.5, 0.1$. The plot should range over $-2 < x < 3$ and $-.1 < y < 1.1$. 