**Math 131BH Winter 2013: Homework 5, Due 2/13**

1. Let $f$ be a continuous function from $\mathbb{R} \to \mathbb{R}$, and let $g \in C^1(\mathbb{R})$ with $g = 0$ outside $[0, 1]$. show that the convolution function

$$(f * g)(x) = \int f(x + t)g(t)dt$$

is well defined and is in $C^1(\mathbb{R})$. It then follows that if $f$ is continuous and if $g \in C^\infty(\mathbb{R})$ with compact support then $f * g \in C^\infty(\mathbb{R})$ with compact support then $f * g \in C^\infty(\mathbb{R})$.

2-4. Rudin p. 196 Ex. 2,3,6.