

Problem 10. Show that the convolution function  $\phi$  defined by  $(f * g)(x)$  over  $\mathbb{R}^n$  is infinitely many times differentiable, when  $f$  is  $\mathcal{L}$ -integrable and  $g$  is infinitely many times differentiable over  $\mathbb{R}^n$  that vanishes on ends of  $\mathbb{R}^n$ .