Problem 4. Assume that $f : (-1, 1) \to \mathbb{R}$ is a continuously differentiable function such that $f(0) = 0$. Define
$$g(x) = \begin{cases} -f(x)^2, & x < 0 \\ f(x)^2, & x \geq 0 \end{cases}$$
Show that g is differentiable on $(-1, 1)$.