Quiz 4

Student ID Number: Name _____

Math 140B, 5PM

Please justify all your answers February 14, 2014

Please also write your full name on the back

1. (a) Suppose that g is *continuous* at $x = 0$. Prove that $f(x) = xg(x)$ is differentiable at $x = 0$.

   (b) Conversely, suppose that $f(0) = 0$ and f is differentiable at $x = 0$. Prove that there is a function g that is continuous at $x = 0$ and satisfies $f(x) = xg(x)$. *Hint: What should* $g(0)$ *be?*

2. If f and g are differentiable on $[a, b]$ and $f'(x) = g'(x)$ for all $a < x < b$, show that $g(x) = f(x) + c$ for some constant c. Give a proof directly from the mean value theorem.