Derivatives

Pset 6
Due October 22 (4 points each)

(1) page 181:25
(2) page 186:4. Note that $x^{2/3} = (\sqrt[3]{x})^2$, and recall we determined how to take this derivative for $x < 0$ because the root was odd.
(3) page 191:9
(4) Suppose that f is differentiable at $x = c$. Show that $|f|$ is differentiable at $x = c$ provided $f(c) \neq 0$. Give a counterexample when $f(c) = 0$.
(5) Let $f(x) = xg(x)$ where g is a continuous function defined on $[-1, 1]$. Prove that f is differentiable at $x = 0$ and find $f'(0)$ in terms of g. (The hardest part of this problem will be writing all of the details very carefully. Justify your equalities.)
(6) page 208:18

Bonus: Prove a pseudo-converse to (4). In particular, prove that if $|f|$ is differentiable at $x = c$ and f is continuous at $x = c$, then f is differentiable at $x = c$.

18.014 Calculus with Theory
Fall 2010