Quiz 4: Friday, February 1, 2008

1. (2 points) Circle True or False for each statement.
   (a) True or False: If a function $f$ is continuous at $a$, then $f$ is differentiable at $a$.
   (b) True or False: If a function $f$ is differentiable at $a$, then $f$ is continuous at $a$.

2. (8 points) Use the (limit) definition of derivative to find $f'(x)$ where $f(x) = \frac{5x}{x-1}$. Show all steps. Use notation correctly.

   $f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h} \leftarrow$ always start with this first line

   $= \lim_{h \to 0} \frac{\frac{5(x+h)}{(x+h)-1} - \frac{5x}{x-1}}{h}$

   $= \lim_{h \to 0} \frac{(x+h-1)(x-1)}{(x+h-1)(x-1)} \left[ \frac{5x+5h}{x+h-1} - \frac{5}{x-1} \right]$

   $= \lim_{h \to 0} \frac{(x-1)(5x+5h) - 5x(x+h-1)}{h(x+h-1)(x-1)}$

   $= \lim_{h \to 0} \frac{5x^2 + 5xh - 5x - 5h - 5x^2 - 5xh + 5x}{h(x+h-1)(x-1)}$

   $= \lim_{h \to 0} \frac{-5h}{h(x+h-1)(x-1)} \leftarrow$ always write this step.

   $= \lim_{h \to 0} \frac{-5}{(x+h-1)(x-1)}$

   $= \frac{-5}{(x+0-1)(x-1)}$

   $= \frac{-5}{(x-1)^2}$