Name: _____

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Math 120 Calculus I

Quiz

September 2013

You may use a calculator on this quiz if you like. Points for each problem are in square brackets.

1. Recall that we define $\lim_{x \to a} f(x) = L$ to mean

$$\forall \epsilon > 0, \exists \delta > 0, \forall x \, (0 < |x - a| < \delta \Rightarrow |f(x) - L| < \epsilon).$$

Here, you will use that definition to prove that if $\lim_{x \to 7} kx = 7k$.

a. [2] First translate the definition to the particular case you have here, where $a = 7$, $f(x) = kx$, and $L = 7k$.

b. [3] Now let $\epsilon > 0$. Find a value of δ that satisfies the condition you wrote down in part **a**. (Show your work.)

2. True/false. [1 point each part] For each sentence write the whole word "true" or the whole word "false". If it's not clear whether it should be considered true or false, you may explain in a sentence if you prefer.

_____ **a.** If you find one positive value of δ that works for a given value of ϵ, then all smaller positive values of will also work.

_____ **b.** The δ in the definition of limit must work for all values of ϵ.

_____ **c.** If $\lim_{x \to a} f(x) \neq L$, then there is some $\epsilon > 0$ such that for all $\delta > 0$, there is some x so that $0 < |x - a| < \delta$ yet $|f(x) - L| \geq \epsilon$.

_____ **d.** If $f(x)$ gets closer to L as x approaches a, then $\lim_{x \to a} f(x) = L$.

_____ **e.** If $\lim_{x \to a} f(x) = L$, then $f(x)$ gets closer to L as x approaches a. (Note that **e** is the converse of **d**.)