Name _____

Homework 8
section 1.7

Be sure to use the definition of continuity for questions 1 & 3 (there should be some limits).

1. (4) Find a constant k so that the following function is continuous on any interval:

$$g(t) = \begin{cases} kt & 0 \leq t < 3 \\ 2t^2 & 3 \leq t. \end{cases}$$

2. (4) Consider the function $f(x) = \begin{cases} \frac{x}{|x|} & x \neq 0 \\ 0 & x = 0 \end{cases}$

   (a) What is $\lim_{x \to 0^+} f(x)$?

   (b) What is $\lim_{x \to 0^-} f(x)$?

   (c) What is $\lim_{x \to 0} f(x)$?

   (d) Is the function continuous on $[-1, 1]$? Give a brief explanation.

3. (6) Consider the function $f(x) = \begin{cases} e^{cx} & x < 0 \\ (x+c)^2 & 0 \leq x < 2 \\ 2x + 6c & x \geq 2 \end{cases}$. Is there a constant c so that $f(x)$ is continuous?

4. (6) A 0.7 ml dose of a drug is injected into a patient steadily for one second. At the end of this time, the quantity Q of the drug in the body starts to decay exponentially at a continuous rate of 0.3% per second. Using formulas, express Q as a continuous (piecewise) function of time, t in seconds. *Hint:* it may help to draw the graph first.