Name ____________________

Homework 7

Sections 1.7 & 1.8

Be sure to use the definition of continuity for number 4 (i.e. there should be some limits).

1. (6) Given $\lim_{x\to 3} f(x) = 4$, $\lim_{x\to 3} g(x) = -2$ and $h(3) = 5$, compute the following, if possible. Show your use of the properties of limits. If it is not possible to compute one of the following, explain why not.

   (a) $\lim_{x\to 3} (xf(x))$

   (b) $\lim_{x\to 3} \dfrac{(g(x))^2}{f(x)}$

   (c) $\lim_{x\to 3} (h(x)f(x))$

   (d) $\lim_{x\to 3} (f(x)+2)$

2. (4) Find a value of the constant k so that the following limit exists. *Hint:* What feature(s) of the graph of the rational function would make the limit exist or not exist?

$$\lim_{x\to 2} \frac{x^2 - kx + 6}{x - 2}$$

3. (4) For each of the following, give an example of a function with the properties described. [1pt for a graph, 2pts for a function in formula form]

   (a) Continuous on $[0,1]$ but not continuous on $[1,3]$.

   (b) Strictly increasing but not continuous on $[0,10]$.

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