Math 114 Fall 2016
Calculus I HW 2
Due Friday, September 16

1. Find (with proof) $\lim_{x\to 5} \frac{1}{x-4}$.

2. Let
$$f(x) = \begin{cases} 1 & x < 2 \\ 2 & x = 2 \\ 3 & x > 2 \end{cases}$$

   What is $f(2)$? Prove that $\lim_{x\to 2} f(x)$ does not exist.

3. ($\star$) Prove that $\lim_{x\to 0} \frac{|x|}{x}$ does not exist.

4. Let
$$g(x) = \begin{cases} 2x & x < 2 \\ 5x^2 - 7 & x \geq 2 \end{cases}$$

   Find (with proof) $\lim_{x\to 2^-} g(x)$.

5. Let a and c be any constants. Prove that $\lim_{x\to a} c = c$.

6. ($\star$) Let a and $c \neq 0$ be constants, and let f be a function such that $\lim_{x\to a} f(x) = L$. Prove that $\lim_{x\to a} (cf(x)) = c\left(\lim_{x\to a} f(x)\right) = cL$.