

Math 114 Spring 2017
Calculus I HW 3
Due Friday, February 10

1. Let

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

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

2. Let

$$j(x) = \begin{cases} x - 1 & x < 0 \\ x + 1 & x \geq 0 \end{cases}$$

Show that $\lim_{x \rightarrow 3} j(x) = 4$.

3. (★) For the same function j , show that $\lim_{x \rightarrow 0} j(x)$ does not exist.
4. (★) Prove that $\lim_{x \rightarrow 0} \frac{|x|}{x}$ does not exist.

5. Let

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

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

6. Let

$$h(x) = \begin{cases} x & x < -1 \\ x^2 & x > -1 \end{cases}$$

Find (with proof) $\lim_{x \rightarrow -1^+} h(x)$.

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