

Math 114 Spring 2018
Calculus I HW 3
Due Wednesday, September 20

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

$$j(x) = \begin{cases} 3x - 1 & x < 0 \\ 2x + 1 & x \geq 0 \end{cases}$$

Show that $\lim_{x \rightarrow 3} j(x) = 7$.

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. From the definition, prove that $\lim_{x \rightarrow 2} \frac{1}{x-2} = \pm\infty$.
6. From the definition, prove that $\lim_{x \rightarrow -1} \frac{4}{(x+1)^2} = +\infty$.