

Math 190 Lab 4: Oct 4 and 6

Work through the following problems while the instructor and TA circulate. When you have completed the problems (to the satisfaction of the facilitators) you can spend the rest of the lab working on the weeks homework.

Warm up: Compute the following limits

- $\lim_{x \rightarrow 2} e^{-x} \ln x \sin x$
- $\lim_{x \rightarrow 2} \frac{(x-1)}{3x^2 - x - 2}$
- $\lim_{x \rightarrow 1} \frac{(x-1)}{3x^2 - x - 2}$
- $\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - 1}{x}$
- $\lim_{x \rightarrow \infty} e^{-x}$
- $\lim_{x \rightarrow \infty} \cos(3x)$

Questions:

1. Explain in your own words what

$$\lim_{x \rightarrow 4} f(x) = 3$$

means. Draw the graph of a function for which the above limit is equal to 3. Can such a function have $f(4) = 2$?

2. Compute the following limits

- (a) $\lim_{x \rightarrow 0} |x|$
- (b) $\lim_{x \rightarrow 1} \frac{|x-1|}{x-1}$
- (c) $\lim_{x \rightarrow 2^-} f(x)$ and $\lim_{x \rightarrow 2^+} f(x)$ where

$$f(x) = \begin{cases} \frac{x^2 - 5x + 6}{x - 2}, & x < 2 \\ -x^3 + 7, & x \geq 2 \end{cases}$$

what does this say about the full limit:

$$\lim_{x \rightarrow 2} f(x)?$$