

# MATH 190, Lab 5: Oct 9 and 11, 2018

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Work through the following problems while the TAs circulate. When you have completed the problems (to the satisfaction of the facilitators) you can spend the rest of the lab working on Homework 3 problems posted on Canvas.

## Warm-up.

Discuss in your group the meaning of the following statements, their translation in mathematical formulas and their graphical interpretation.

- A function has a vertical asymptote at some number  $c$ .
- A function has a horizontal asymptote at some number  $b$ .

## Problems.

1. Compute the following limits.

(a)  $\lim_{x \rightarrow -1^+} \frac{x+1}{1-x^2}$

(b)  $\lim_{x \rightarrow 1^+} \frac{x+1}{1-x^2}$

(c)  $\lim_{x \rightarrow 3^+} \ln(x-3)$

(d)  $\lim_{x \rightarrow -\infty} x^3 - 100x^2 + 1$

2. Find all vertical and horizontal asymptotes of the following functions. Ensure you compute (and show the computation of) all the relevant limits. Sketch a rough graph of the function around its asymptotes.

(a)  $\frac{x-4}{x^2-2x-8}$

(b)  $\frac{x^2-2x-8}{x-4}$

(c)  $\frac{e^x}{e^x-2}$

3. Use the limit definition (and not any other method) to find the slope of the tangent line to the function  $f(x) = \frac{1}{x}$  at  $x = 2$  and use it to find the equation of the tangent line at this point.