Math 1231 Fall 2022
Single-Variable Calculus I Section 16
Mastery Quiz 2
Due Monday, September 12

This week's mastery quiz has two topics. Please do your best on that topic. Don't worry if you make a minor error, but try to demonstrate your mastery of the underlying material.

Feel free to consult your notes, but please don't discuss the actual quiz questions with other students in the course.

If you got a 2/2 on Topic S1: Estimation last week, you do not need to submit it again. Everyone should submit Topic M1: Computing Limits.

Remember that you are trying to demonstrate that you understand the concepts involved. For all these problems, justify your answers and explain how you reached them. Do not just write "yes" or "no" or give a single number.

Please turn this quiz in class on Monday. You may print this document out and write on it, or you may submit your work on separate paper; in either case make sure your name and recitation section are clearly on it. If you absolutely cannot turn it in in person, you can submit it electronically but this should be a last resort.

Topics on This Quiz

- Major Topic 1: Computing Limits
- Secondary Topic 1: Estimation

Name:

Recitation Section:

Major Topic 1: Computing Limits

Compute the following limits, justifying your answers with clean and correct work.

(a) $\lim_{x\to 3} \dfrac{\sqrt{x+1}-2}{x-3} =$

(b) $\lim_{x\to 2} \dfrac{x^2+x-5}{3-x} =$

(c) $\lim_{x\to 1} \dfrac{1}{x-1} - \dfrac{1}{x^2-x} =$

Secondary Topic 1: Estimation

(a) Suppose $f(x) = \sqrt{x+1}$, and we want an output of approximately 3. What input a should we aim for? Find a δ so that if our input is $a \pm \delta$ then our output will be $3 \pm .5$. Explain how you found this δ and why it should give us what we want.

(b) We want to build a ramp that's eight times long as it is tall, and we want it to reach a height of 10 meters. Find a formula for δ in terms of ϵ, so that if the error in the *length* is less than δ then the error in the height is less than ϵ. Make sure your formula gives the **largest δ possible**, and justify your answer.