Math 1231 Spring 2024
Single-Variable Calculus I Section 11
Mastery Quiz 2
Due Tuesday, January 30

This week's mastery quiz has two topics. Everyone should submit topic M1. If you have a 2/2 on topic S1 already, you don't need to submit it again; but if you have a 1/2 or a 0/2 you should submit it.

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.

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 Thursday. 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

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

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

(c) Let $f(x) = \begin{cases} x^2-1 & x<2 \\ 3x-3 & x>2 \end{cases}$. Compute $\lim_{x\to 2} f(x)$.

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 can make a pound of charcoal from nine pounds of wood, and we want to produce about 8 pounds of charcoal. Find a formula for δ in terms of ϵ, so that if the error in the amount of *wood* is less than δ then the error in the amount of charcoal is less than ϵ. Make sure your formula gives the **largest δ possible**, and justify your answer.