Math 1231 Fall 2025
Single-Variable Calculus I Section 12
Mastery Quiz 4
Due Wednesday, September 24

This week's mastery quiz has three topics. Everyone should submit topic M2. If you have a 2/2 on S2 you don't need to submit it this week; if you have a 4/4 on M1 you don't need to submit it this week. (Check Blackboard for your current scores!)

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.

Topics on This Quiz

- Major Topic 1: Computing Limits
- Major Topic 2: Computing Derivatives
- Secondary Topic 2: Definition of Derivative

Name:

Recitation Section:

Major Topic 1: Computing Limits

(a) $\lim_{x \to -2} \dfrac{\tan(2x+4)}{x+2}$

(b) $\lim_{x \to 1} \dfrac{\sqrt{x+1}-2}{x-1}$

(c) Compute $\lim_{x \to 3} \dfrac{x^2-5x+6}{x^2-x-6} =$

Major Topic 2: Computing Derivatives

(a) Explicitly justifying each step and naming each derivative rule you use, compute $\frac{d}{dx}\frac{\sin(x)+1}{2x^2-5}$.

(b) Compute the derivative of $h(x) = \frac{5}{x^4}$.

(c) Compute $\dfrac{d}{dx}(5x^7 - 3x)\left(x^{4/3} + \dfrac{1}{x}\right)$

Secondary Topic 2: Definition of Derivative

(a) **Directly from the definition of derivative,** compute the derivative of $f(x) = x^2 + \sqrt{x}$ at $a = 2$.

(b) If $g(x) = \frac{x}{x+2}$, find $g'(x)$ explicitly using the definition of derivative.