

Math 1231 Fall 2022  
Single-Variable Calculus I Section 13  
Mastery Quiz 3  
Due Thursday, September 22

This week's mastery quiz has three topics. Everyone should submit M1 and S3. If you already have a 2/2 on S2, you don't need to submit it again.

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 2: The Squeeze Theorem
- Secondary Topic 3: Definition of Derivative

**Name:**

**Recitation Section:**

## Major Topic 1: Computing Limits

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

(b) 
$$\lim_{x \rightarrow 0} \frac{\sin(5x^2) + \tan^2(x)}{x^2} =$$

(c) 
$$\lim_{x \rightarrow -\infty} \frac{3x^2 + 2x + 1}{\sqrt{x^4 - x^2 + x}} =$$

## Secondary Topic 2: The Squeeze Theorem

Show that  $\lim_{x \rightarrow 2} (x - 2)^2 \left( 1 + \sin \left( \frac{2}{(x - 2)^3} \right) \right) = 0$ .

## Secondary Topic 3: Definition of Derivative

Compute the following derivatives, *directly from the formal definition of derivative*.

(a) If  $f(x) = \sqrt{x + 3}$ , find  $f'(6)$ .

(b) If  $g(x) = x^3 - 3x$ , find  $g'(x)$ .