# Math 1231 Fall 2026
# Single-Variable Calculus I Section 11
# Mastery Quiz Worksheet 3
# Due Friday, September 11

This week's mastery quiz has only one topic.

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

On Friday, we will end class with a short quiz, containing questions drawn from this worksheet, plus one "easy" question on topic M1. You may not use or consult any materials or notes during Wednesday's quiz; make sure you work through these problems carefully, and understand them well enough that you can replicate that work in class.

**Topics on This Quiz**

- Major Topic 1: Computing Limits

## Name:

## Recitation Section:

# Major Topic 1: Computing Limits

(a) Compute $\lim_{x\to 0} \dfrac{\sin(3x)\sin(4x)}{x\sin(2x)} =$

**Solution:**

$$\begin{aligned}\lim_{x\to 0} \frac{\sin(3x)\sin(4x)}{x\sin(2x)} &= \lim_{x\to 0} \frac{\sin(3x)}{3x}\frac{\sin(4x)}{4x}\frac{12x^2}{x\sin(2x)} \\ &= \lim_{x\to 0} \frac{2x}{\sin(2x)}\frac{6x}{x} \\ &= \lim_{x\to 0} \frac{6x}{x} = 6.\end{aligned}$$

(b) Compute $\lim_{x\to 4^+} \dfrac{x+1}{x-4} =$

**Solution:** The limit of the top is 5 and the limit of the bottom is 0, so the limit is $\pm\infty$. Since the bottom will always be positive as we approach from the right, the overall limit is in fact $+\infty$.

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

**Solution:**

$$\lim_{x\to 1} \frac{1}{x-1} - \frac{1}{x^2-x} = \lim_{x\to 1} \frac{x^2-x-(x-1)}{(x-1)(x^2-x)} = \lim_{x\to 1} \frac{(x-1)^2}{x(x-1)^2} = \lim_{x\to 1} \frac{1}{x} = 1.$$