Math 1232 Spring 2026
Single-Variable Calculus 2
Mastery Quiz 9
Due Thursday, March 26

This week's mastery quiz has two topics. Everyone should submit work on M3. If you have a 2/2 on S7, you don't need to submit it again. (Please check Blackboard to confirm your scores!) This will be the last quiz featuring S7.

Don't worry if you make a minor error, but try to demonstrate your mastery of the underlying material. 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.

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

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.

Topics on This Quiz

- Major Topic 3: Series Convergence
- Secondary Topic 7: Sequences and Series

Name:

Recitation Section:

M3: Series Convergence

(a) Analyze the convergence of the series $\sum_{n=2}^{\infty} \frac{\ln(n) + n}{n^2 - 1}$

(b) Analyze the convergence of the series $\sum_{n=1}^{\infty} \frac{n^3}{n^4 + 7}$.

(c) Analyze the convergence of the series $\sum_{n=1}^{\infty} \frac{1}{n^2+4}$.

S7: Sequences and Series

(a) Compute $\sum_{n=1}^{\infty} \frac{-1}{n^2+5n+6}$. Rigorously justify your computation of this limit.

(b) Consider the sequence $(a_n) = (3, {}^{6}\!/_{2}, {}^{9}\!/_{6}, {}^{12}\!/_{24}, {}^{15}\!/_{120}, \dots)$. Find a formula for the nth term a_n. Compute $\lim_{n\to\infty} a_n$.

(c) Let $b_n = \tan\left(\frac{(2n-1)\pi}{4}\right)$. Compute the first four terms of the sequence, and compute $\lim_{n\to\infty} b_n$, with justification.

(d) Compute $\displaystyle\sum_{n=1}^{\infty} \frac{(-4)^{n-1}}{5^n}$.