Math 1232 Spring 2026
Single-Variable Calculus 2
Mastery Quiz 12
Due Thursday, April 16

This week's mastery quiz has three topics. Everyone should submit work on both M4 and S9. If you have a 4/4 on M3, you don't need to submit it again. This is the last quiz with M3.

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
- Major Topic 4: Taylor Series
- Secondary Topic 9: Applications of Taylor Series

Name:

Recitation Section:

M3: Series Convergence

(a) Analyze the convergence of the series $\sum_{n=1}^{\infty}(-1)^n \frac{n^2+n-3}{n^2 4^n}$

(b) Analyze the convergence of $\sum_{n=1}^{\infty} \frac{(-1)^n \sqrt{n}}{2n+3}$

(c) Analyze the convergence of $\sum_{n=1}^{\infty}(-1)^n \frac{\sin(1/n)}{n^2}$.

M4: Taylor Series

(a) Using series we already know, write down a formula for the (infinite) Taylor series for $x(8+x)^{5/3}$, and then write down the degree-four polynomial explicitly.

(b) Estimate the error if you use $T_4(x) = 1 - \frac{x^2}{2} + \frac{x^4}{4!}$ to approximate $g(x) = \cos(x)$ at $x = -.5$.

(c) Let $f(x) = \sin(x)$. Use *the definition of a Taylor series* to find $T_3(x, \pi/3)$ (centered at $\pi/3$) for this function. (That is, find the terms up through the degree-three term.)

S9: Applications of Taylor Series

(a) Use a degree-five Taylor polynomial to estimate sin(.3). Give an upper bound for the error in that estimate.

(b) If $f(x) = \sum_{n=0}^{\infty} \frac{n+1}{n!+1} x^n$, compute $\int_3^5 f(x)$.

(c) Use a Taylor series to compute $\lim_{x \to 0} \frac{xe^{x^3} - x - x^4}{x^7} =$