Math 1232 Spring 2024
Single-Variable Calculus 2 Section 12
Mastery Quiz 11
Due Tuesday, April 16

This week's mastery quiz has three topics. Everyone should submit topic M4. If you have a 4/4 on M3, or a 2/2 on S8, you don't need to submit them.

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 Tuesday. 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 3: Series Convergence
- Major Topic 4: Taylor Series
- Secondary Topic 8: Power Series

Name:

Recitation Section:

M3: Series Convergence

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

(b) Analyze the convergence of the series $\sum_{n=2}^{\infty} \frac{n}{\ln(n)}$

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

M4: Taylor Series

(a) In class we computed a Taylor series for $\sin(x)$ centered at zero. Use the degree-seven Taylor polynomial to approximate $\sin(3) \approx T_7(3, 0)$. (You don't need to numerically simplify this.)

Using the Taylor series remainder, find an upper bound for the error in this approximation.

(b) Using series we already know, write down a formula for the (infinite) Taylor series for $(1 + 3x)^{2/3}$, and then write down the degree-three polynomial explicitly.

(c) Using series we already know, write down a formula for the (infinite) Taylor series for $x^2 \ln(1 - 2x^3)$, and then write down the degree-eleven polynomial explicitly.

S8: Power Series

(a) Find the radius of convergence and the interval of convergence of $\sum_{n=0}^{\infty}(n(x-3))^n$.

(b) Find the radius of convergence and the interval of convergence of $\sum_{n=0}^{\infty}\frac{(5x-3)^n}{\sqrt{n}}$.