

Math 1232 Spring 2022  
Single-Variable Calculus 2 Mastery Quiz 10  
Due Tuesday, April 5

This week's mastery quiz has three topics. This is your first opportunity for M4 and S8. It is the third opportunity for M3, so you may not need to submit that one.

(**Important:** I know I haven't used the word "Taylor Series" in class yet, but the content under M4 is all things we've covered and you should be able to give it a shot.)

Feel free to consult your notes or speak to me privately, but please don't talk about the actual quiz questions with other students in the course or post about it publicly.

Don't worry if you make a minor error, but try to demonstrate that you understand the concepts involved and have mastered the underlying material. 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 through Blackboard 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

Analyze the convergence of the following three series. (Specify if they converge absolutely, converge conditionally, or diverge.)

(a) 
$$\sum_{n=2}^{\infty} \frac{\ln(n) + n}{n^2 - 1}$$

(b) 
$$\sum_{n=1}^{\infty} \frac{(-1)^n (3n^2 + 5n + 2)^n}{(5n^2 - 3)^n}$$

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(c) 
$$\sum_{n=1}^{\infty} \frac{(-1)^n \sqrt{n}}{2n+3}$$

**M4: Taylor Series**

- (a) Write a power series expression for  $\frac{2x^2}{4x+1}$  centered at 0. What is the radius of convergence?

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

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- (c) Write a power series expression for  $\ln(x^2)$  centered at 1. What is the radius of convergence?

**S8: Power Series**

(a) Find the radius of convergence and the interval of convergence of  $\sum_{n=1}^{\infty} \frac{(2x - 5)^n}{n^2}$ .

(b) Find the radius of convergence and the interval of convergence of  $\sum_{n=1}^{\infty} \frac{n^2 x^n}{1 \cdot 3 \cdot 5 \cdots (2n - 1)}$ .