

Math 1232 Spring 2022  
Single-Variable Calculus 2 Mastery Quiz 12  
Due Tuesday, April 19

This week's mastery quiz has three topics. This is your first attempt on secondary topics S9 and S10. It's the third attempt for M4, so it's possible but unlikely you don't need to submit it.

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 4: Taylor Series
- Secondary Topic 9: Taylor Series Applications
- Secondary Topic 10: Parametrization

**Name:**

**Recitation Section:**

**M4: Taylor Series**

(a) If  $f(x) = \sum_{n=0}^{\infty} \frac{3^n}{n!} (x+2)^n$ , compute  $\frac{d}{dx} f(x)$  and  $\int f(x) dx$ .

(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.

Name:

Recitation Section:

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- (c) Find an upper bound for the error if you use  $T_3(x) = x - \frac{x^2}{2} + \frac{x^3}{3}$  to approximate  $g(x) = \ln(1+x)$  at  $x = .5$ .

**S9: Applications of Taylor Series**

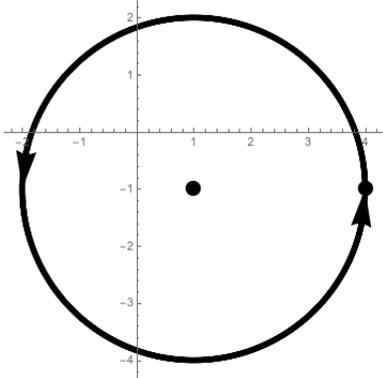
(a) Use a Taylor series to compute  $\lim_{x \rightarrow 0} \frac{\cos(x^2) - 1 + x^4/2}{x^8} =$

(b) Use a degree-three Taylor polynomial to estimate  $\sqrt{1.2}$ .

(c) Use a degree-five Taylor polynomial to estimate  $\arctan(.1)$ .

## S10: Parametrization

- (a) Find a parametrization for the circle of radius 3 centered at  $(1, -1)$ , starting at  $(4, -1)$  and going **counterclockwise twice** around the circle.



- (b) Find a parametrization of the ellipse  $x^2 + y^2/4 = 1$ . (Hint: what are the  $x$  and  $y$  intercepts?)

- (c) Find an equation of the line tangent to the curve  $x = 1 + \sqrt{t}, y = t^3$  at the point  $(2, 1)$ .