

# MTH 252 Lab

## Day One

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### Purpose

- Each day, we will work in class on a lab.
- This will *not* be collected.
- The purpose of this lab is to practice what we've learned in class with assistance available to you.
- Another purpose is to see some information that Damien wants to stress.
- You will be able to ask for help from Damien, your lab attendant, and each other.
- You are encouraged to work together, but this is not required.
- If you do not finish, then that is okay – I encourage you to work through it on your own time.

### What Will Be Turned In?

- Periodically, a **Lab Report** will be assigned.
- This Lab Report *will* be collected and graded on completeness and correctness.
- Previous lab prompts will comprise the prompts of each Lab Report, either precisely or approximately.

### Today's Lab

This lab is meant to accomplish two things. First, to make sure we are all on the same page about expectations, both with studentship and with mathematics. Most all of the skills you learned in algebra, precalculus, and calculus courses will be necessary for your success in this course. These prompts are meant to allow you to self-diagnose any gaps in knowledge you may have. Take some time to work through all of these exercises, and note any time you feel unsure or hesitant about *any* spot or step you take. These are times you will want to ask for assistance.

## Prompts

1. The syllabus has a *lot* of important information. Use it to answer the following questions:
  - (a) What does your instructor prefer to be called?
  - (b) When are your instructor's office hours?
  - (c) What should you do if you don't finish an assignment, will be late for class, will have to miss class, or have a question about class?
  - (d) What kind of book does your Reference Book have to be?
  - (e) Under what circumstances does your instructor accept late work?
2. In order to succeed in this course, you must understand what a derivative represents. Given the equation  $y = f(x)$ , respond to the following prompts.
  - (a) Write down an expression that represents the derivative of  $y$  with respect to  $x$  in prime notation.
  - (b) Write down an expression that represents the derivative of  $y$  with respect to  $x$  in Leibniz notation.
  - (c) In your group, come up with a description of what the derivative of a function  $f(x)$  at a number  $x = a$  means.
3. In order to succeed in this course, you must be able to differentiate effectively! Differentiate the following equations with respect to  $x$ .
  - (a)  $y = e^{3x} - 8x + \sqrt{x} - 0.5$
  - (b)  $g(x) = \frac{3}{x}$
  - (c)  $y = 7^x$
  - (d)  $c(x) = x^2 \cos 2x$
  - (e)  $t(x) = \tan(x^2)$
  - (f)  $T(x) = \arctan x$
  - (g)  $L(x) = \ln(x^3)$

4. The following function may or may not have been introduced to you before, but I will be asking you to be familiar with it through this class.

$$f(x) = \sqrt{r^2 - x^2} \quad , r > 0$$

Use this function to work through the following.

- (a) Open <https://www.desmos.com/calculator/0zbuzhslm2>. Use the slider for  $r$  to get an understanding of how the graph of  $f$  works. What shape is this?
  - (b) What is the domain of  $f$ ?
  - (c) What is the area of the region enclosed between the graph of  $y = f(x)$  and the  $x$ -axis?
5. Solve  $\frac{dy}{dx} = 0$  if  $y = e^{2x}(2 - x)$ .