

# CALCULUS 12 LG 7/8

## EXPONENTIAL AND LOGARITHMIC FUNCTIONS



### INTRODUCTION:

For the most part, exponential and logarithmic functions are a review of what was learned in Math 12 Pre-Calc. We will learn how to take the derivative of these functions in this guide. In addition, we will expand our use of derivatives to solve functions that are not written in the form  $y = f(x)$ . The last section will investigate how the power of Calculus can be used to solve real-life problems.



### LEARNING GUIDE EXPECTATIONS:

On the completion of this learning guide you will be able to:

- 1) model and apply base  $e$  exponential functions and natural logarithmic functions to solve problems.
- 2) compute the derivative of an implicit function.
- 3) use logarithmic differentiation to calculate the derivative of  $y = e^x$  and  $y = \ln x$  type functions.
- 4) model and apply inverse trig functions to solve problems.
- 5) determine the derivative of inverse trig functions.
- 6) solve related rates problems.



### EVALUATION:

When you are ready, write the LG 7/8 quiz in the test centre.



### RESOURCES NEEDED:



Calculus 12 text.



[www.thssmath.com](http://www.thssmath.com)

## LEARNING ACTIVITIES



**Expectation #1: Model and apply base e exponential functions and natural logarithmic functions to solve problems.**



1. [Watch and take notes on instructional video on Inverse of a Function.](#)



2. In Chapter 4.1, read pages 225-233. This should be review from Math 12 Pre-Calc but if there is anything here you have forgotten, make a note of it in your journal.

3. On pages 233-235, complete questions #1, 3, 5, 12, 13-27.



4. [Watch and take notes on instructional video on Logarithmic and Exponential Functions.](#)



5. In Chapter 4.2, read pages 235-243. Again, this should be a review of Math 12 Pre-Calculus but if there is anything you have forgotten, make a note of it in your journal.

6. On pages 243-245, complete questions #1-33, 48.



**Expectation #2: Compute the derivative of an implicit function.**



1. [Watch and take notes on instructional video on Implicit Differentiation.](#)



2. In Chapter 4.3, read pages 246-247.



3. In your journal, using an example, describe in your own words how to take the derivative of an implicit function.



4. On pages 253-254, complete questions #1-31, 39, 41, 43.



**Expectation #3: Use logarithmic differentiation to calculate the derivative of  $y = e^x$  and  $y = \ln x$  type functions.**



1. [Watch and take notes on instructional video on Derivatives of Logarithmic & Exponential Functions.](#)



2. In Chapter 4.4, read pages 255-259.



3. In your journal, write down the derivatives of the functions in the blue boxes using an example to illustrate each one:



4. On pages 260, complete questions #1-45.



**Expectation #4: Model and apply inverse trig functions to solve problems.**



**Expectation #5: Determine the derivative of inverse trig functions.**



1. [Watch and take notes on instructional video on Inverse Trig Functions.](#)



2. [Watch and take notes on instructional video on Derivatives of Inverse Trig Functions.](#)



3. In Chapter 4.5, read pages 261-267.



4. In your journal, describe how you would graph an inverse trig function given the trig function. Also, include the derivatives of the inverse trig functions found on page 266.



5. On pages 267-269, complete questions #1-15, 21-29, 39.



**Expectation #6: Solve related rates problems.**



1. [Watch and take notes on instructional video on Related Rates.](#)



2. In chapter 4.6, read pages 270-274.



3. In your journal, using an example, describe how you solve a related rates question. The strategy on page 271 in the blue box is good. Make sure it is in your own words.



4. On pages 274-275, complete #1, 3, 5, 9, 11, 13, 15, 21.