

Reading Assignment for Section 3.9

MATH 130: Calculus I, Section 4

Spring Semester 2017

Follow the general guidelines for the Reading Assignment (the salmon colored handout).

Be sure to include and label all four standard parts 1,2,3,4 of the Reading Assignment in what you hand in. Be sure to **staple** together pages if you have more than one, and include your **name** at the top of the page. Neatness is appreciated!!!

Due: at the beginning of class on Monday, March 20th

Read:

Section 3.9: Derivatives of Logarithmic and Exponential Functions, pages 203-210

Notes: This reading discusses the derivative of $y = \ln x$ as well as the general forms of derivatives of exponential and logarithmic functions. Most exciting, the reading describes logarithmic differentiation, which allows us to take derivatives of more complicated functions! A key to many of the ideas in this section is the fact that $y = e^x$ and $y = \ln x$ are inverse functions, which we discussed at the beginning of the semester.

Remember that your answers should include complete sentences for every question. Be sure to answer all parts of each question!

Reading Questions for part (1), Response:

- a) (i) State the rule of differentiation for the exponential function $f(x) = b^x$. (ii) This rule should hold for all values of $b > 0$, which means it should hold for e^x . Does it? Explain carefully why it does or does not follow the rule we already have for differentiating e^x .
- b) What are two reasons why logarithmic differentiation is useful? Be specific and use examples to illustrate your words. (You need not actually do the differentiation!)
- c) Note that on page 210 at the very end of the section, when the authors describe how to proceed with logarithmic differentiation, they assume that $x > 0$. (i) Why do they make this assumption? (ii) What if we didn't know if $x > 0$ or not? Is there something that we could do so that we could still do logarithmic differentiation? Explain.

Remember parts 2-4 on the salmon handout!

Optional, but highly recommended: Make flashcards for material in Section 3.9. Sample problems, the differentiation rules for $y = b^x$ and $y = \log_b x$, important steps to remember, etc. could be valuable on flashcards.