

Math 1232: Single-Variable Calculus 2
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Recitation 2

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Problem 1. Let $h(x) = \ln|x|$. We're going to compute the derivative of this two ways.

- (a) If we assume $x > 0$, we can simplify $\ln|x|$. What does it simplify to? What is the derivative?
- (b) If $x < 0$, we can also simplify $\ln|x|$. What does it simplify to? This is a little less obvious. What is the derivative?
- (c) What about when $x = 0$?
- (d) What pattern do we get here?
- (e) Now let's approach this a totally different way. Verify that we can define $|x| = \sqrt{x^2}$. How does that work?
- (f) Use the chain rule to compute $\ln(\sqrt{x^2})$. Does this match your previous answer?

Problem 2. Compute the derivative of $(x + 1)^{\sqrt{x}}$.

Problem 3. Use logarithmic differentiation to compute $\frac{d}{dx} \frac{x^3 \sqrt{x^2 - 5}}{(x + 4)^3}$.

Problem 4. Try to compute the following integrals.

- (a) $\int_0^3 e^x dx$
- (b) $\int_0^{\ln(3)} e^x dx$
- (c) $\int e^{3x} dx$. (Hint: remember u -substitution!)
- (d) $\int 3^x dx$. Hint: there are a couple ways you can approach this.