Math 75A Bonus Assignment – Derivatives of Logarithmic Functions Fall 2008

Must be turned in at the end of class
Monday, November 24

Name: _____
Section: **9:15** **2:15**

Recall that the derivative of $f(x) = \ln x$ is $f'(x) = \frac{1}{x}$. Now try these:

For each function, fill in the derivative.

$f(x)$	$f'(x)$	$f(x)$	$f'(x)$
$3 \ln x$		$\ln(3x^2 + 1)$	
$x^2 \ln x$		$\ln\big((8x^5 - 3)\sin x\big)$	

Do you see an easier way to do the last one above? We can use a logarithm law to rewrite the original function as

$$f(x) = \ln(8x^5 - 3) + \ln(\sin x)$$

and now the derivative should be much easier! Try it again using the above equation:

$f'(x) =$ _____

Are your two answers equal to each other (after some algebra)?

Now try these: for each function, do the following:

(a) Use logarithm laws to rewrite the function so that the terms are logarithms that are as simple as possible.

(b) Find the derivative of the function.

1. $f(x) = \ln\left(\dfrac{x^5 - e^x}{7x + 1}\right)$

over for more fun!

2. $g(x) = \ln\left((x^6 + 6^x)^4\right)$

3. $h(x) = \ln\left((4x^2 - \sqrt{x} + 7)^3(3e^x - 2)^5\right)$

4. $k(x) = \ln\left(\dfrac{\sqrt[3]{9x^4 - 10^{4x-3}}}{(5x^2 + 3)^9(12\sqrt{x-2})^2}\right)$