

Calculus AB Logs and Exponentials Derivatives Unit Quiz Review WS 3

Show all work. No calculators.

1. Find  $\frac{dy}{dx}$       $y = \ln \sqrt[5]{\left(\frac{e^{5x}}{5x^3-9x}\right)^7}$

2. Find  $\frac{dy}{dx}$       $y = \sqrt{(3e^{2x} + 5x)^x}$

3. Given that  $f(g(x)) = x$ .  
Find  $g'(9)$  if  $f(9) = 1$ ,  $f(2) = 9$ ,  
 $f'(2) = -3$  and  $f'(9) = -7$

4.  $f(x) = x^3 - 2x + 10$      Find  $(f^{-1})'(-11)$

---

Find  $\frac{dy}{dx}$  for the following

---

5.

$$y = 4 \log \left( \frac{\sqrt{x^7}}{\sqrt[4]{(3x-2x^4)^3}} \right)$$

6.  $f(x) = e^{4x} ( \log_2(5 - \sqrt[3]{x}) )$

---

7. Use Log differentiation to find the derivative  $dy/dx$

$$f(x) = \frac{(x^5)\sqrt{(4x - 3x^4)^5}}{(x^3 - 4)^5}$$

8. Find  $dy/dx$   $\ln\left(\frac{x}{3y}\right) - xy + y = 12$

9) Find the tangent line equation for the function below at the given point:

$$f(x) = x(3^{3x-6}) \text{ at } (2, 2)$$

## Properties and Derivative Rules to Know

0) Derivative Power Rule:

$$\frac{d}{dx} u^n = n * u^{n-1} * u'$$

B. Logs and Exponential Derivatives

$$1) \frac{d}{dx} \ln u = \frac{u'}{u}$$

$$2) \frac{d}{dx} e^u = e^u * u'$$

$$3) \frac{d}{dx} \log_a u = \left(\frac{1}{\ln a}\right) \frac{u'}{u}$$

$$4) \frac{d}{dx} a^u = (\ln a) a^u * u'$$

Log and Exponential Properties to know

$\ln e = 1$	$\ln 1 = 0$	$\ln e^x = x$
$e^{\ln x} = x$	$\ln(ab) = \ln a + \ln b$	$\ln\left(\frac{a}{b}\right) = \ln a - \ln b$
$\ln a^n = n * \ln a$	$\ln\left(\frac{ab}{cd}\right) = \ln a + \ln b - \ln c - \ln d$	

## Derivative Rules to Know (Blank)

0) Derivative Power Rule:

$$\frac{d}{dx} u^n =$$

### B. Logs and Exponential Derivatives

$$1) \frac{d}{dx} \ln u =$$

$$2) \frac{d}{dx} e^u =$$

$$3) \frac{d}{dx} \log_a u =$$

$$4) \frac{d}{dx} a^u =$$