

Name: \_\_\_\_\_

AP Calc: Derivatives of  $e^u$  and  $\ln u$

Date: \_\_\_\_\_

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Do Now:

Evaluate each:

$$1. \lim_{h \rightarrow 0} \frac{\tan\left(\frac{\pi}{6} + h\right) - \tan\left(\frac{\pi}{6}\right)}{h}$$

$$2. \lim_{h \rightarrow 0} \frac{5\left(\frac{1}{2} + h\right)^4 - 5\left(\frac{1}{2}\right)^4}{h}$$

$$3. \lim_{h \rightarrow 0} \frac{\sin(x+h) - \sin(x)}{h}$$

Using calculator,

$$\frac{d}{dx} e^x =$$

$$\frac{d}{dx} \ln x = \quad , x > 0$$

In general:

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

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

**Examples.**

Find  $\frac{dy}{dx}$  for each of the following.

$$1. y = e^{(x+x^2)}$$

2.  $y = e^{\sqrt{x}}$

3.  $y = \ln(x^2)$

4.  $y = e^{-\frac{x}{4}}$

5.  $y = \ln\left(\frac{1}{x}\right)$

6.  $y = x^2 e^x - x e^x$

7.  $y = \ln(\ln x)$

8.  $y = (\ln x)^2$

9.  $y = x \ln x - x$

10.  $y = \ln(2 - \cos x)$

11.  $y = \ln(x^2 + 1)$

12.  $y = xe^2 - e^x$

13.  $y = \ln\left(\frac{x^2 \sin x}{\sqrt{1+x}}\right)$