4.4 day 2

Monday, October 16, 2017 10:28 AM

Skill check:

A. Evaluate $\ln e$

1

B. Evaluate $e^{\ln 5}$

5

C. Rewrite $\ln x^5$

$5\ln x$

D. Solve $\ln x = 4$

$x = e^4 = 54.5982$

E. Solve $5^x = 80$

$\log_5 80 = x$

$x = 2.7227$

Last 2 formulas to learn before the test! Extensions from yesterday ...

What is the derivative of 7^x or 5^x or a^x? They sort of look like e^x!

$$y = 5^x$$

$$\ln y = \ln 5^{(x)}$$

$$\ln y = x \cdot \ln 5$$

$$\frac{1}{y}\frac{dy}{dx} = \ln 5$$

$$\frac{dy}{dx} = y \cdot \ln 5$$

$$= 5^x \cdot \ln 5$$

The derivative of $y = a^x$ is $y' = a^x \cdot \ln a$.

Looks like another great flash card!

Find the following derivatives. Don't forget Chain Rule!

① $y = 8^x$

$y' = 8^x \cdot \ln 8$

② $y = 7^{\cos x}$

$y' = y = 7^{\cos x} \cdot \ln 7 \cdot -\sin x$

(1) $y = 8^x$

$y' = 8^x \cdot \ln 8$

(2) $y = 7^{\cos x}$

$y' = y = 7^{\cos x} \cdot \ln 7 \cdot -\sin x$

$= -\ln 7 \sin x \cdot 7^{\cos x}$

(3) $y = 50^{\sec x}$

$y' = 50^{\sec x} \cdot \ln 50 \cdot \sec x \tan x$

$= \ln 50 \sec x \tan x \cdot 50^{\sec x}$

(4) $y = 15^{3x}$

$y' = 15^{3x} \cdot \ln 15 \cdot 3$

$= 3 \ln 15 \cdot 15^{3x}$

Last ONE!!

what's the derivative of $y = \log_5 x$, $y = \log_3 x$, $y = \log_a x$?

They sort of look like $y = \log_e x = \ln x$!

$$y = \log_5 x$$

$$\frac{d}{dx} 5^y = \frac{d}{dx} x$$

$$5^y \cdot \ln 5 \frac{dy}{dx} = 1$$

$$\frac{dy}{dx} = \frac{1}{5^y \ln 5} = \frac{1}{x \ln 5}$$

The derivative of $y = \log_a x$ is $y' = \frac{1}{\ln a \cdot x}$.

looks like a great flash card!

Find the derivatives of the following functions. Don't forget Chain Rule!

(5) $y = \log_7 (8-3x)$

$y' = \frac{1}{\ln 7 \cdot (8-3x)} \cdot -3 = \frac{-3}{\ln 7 (8-3x)}$

(6) $y = \log_{14} \ln x$

$y' = \frac{1}{\ln 14 \cdot \ln x} \cdot \frac{1}{x} = \frac{1}{x \ln 14 \ln x}$

(7) $y = \log_{82} x^6$

$y' = \frac{1}{(\ln 82) x^6} \cdot 6x^5$

$= \frac{6}{x \ln 82}$

(8) $y = \log_{17} \cos^{-1} x$

$y' = \frac{1}{\ln 17 \cdot \cos^{-1} x} \cdot \frac{-1}{\sqrt{1-x^2}}$

(9) $y = \frac{1}{\log_{13}(4x+5)} = \left[\log_{13}(4x+5)\right]^{-1}$

$y' = -1\left[\log_{13}(4x+5)\right]^{-2} \cdot \frac{1}{\ln 13 (4x+5)} \cdot 4$

$= \frac{-4}{\ln 13 \cdot (4x+5)\left[\log_{13}(4x+5)\right]^2}$

(10) Let $m(x)$ and $p(x)$ be inverses. Evaluate $p'(8) \cdot p'(-4)$.

x	$m(x)$	$m'(x)$
3	-2	1
-2	8	-0.25
-4	5	0.5
0	-4	-6
8	0	2

$-4 \cdot \frac{-1}{6} = \frac{2}{3}$

thx time!