# Answer Key to Week #6 Assignment

# Problem 1.

Find (	the derivative of the function of x: $10^{\rm x}$
Answers '	
	x ln 10
	$10^{X} \ln x$
	10 <sup>x</sup>
$\checkmark$	10 <sup>X</sup> ln 10
Problem	2.
Find $y = t^{\frac{1}{2}}$	the derivative of the following function: 5 – e
Answers *	
	<sub>t</sub> 5 – e
	$(4 - e)t^{5 - e}$
<b>✓</b>	$(5 - e)t^4 - e$

#### Problem 3.

Find	the	derivative	of	the	following	function
-IIIu	uie	derivative	ΟI	uie	Tollowing	Turiction:

$$y=2^{\ln(6t)}$$

Answers \*



$$\frac{\ln 2}{t} 2^{\ln 6t}$$

$$\frac{6 \ln 2}{t}$$

$$\frac{6 \ln 2}{t} 2 \ln 6t$$

# Problem 4.

Find the derivative of the following function:

$$y = 3\sqrt{t}$$

Answers \*



$$\frac{\ln 3\sqrt{t}}{2\sqrt{t}}$$

$$\frac{1}{2\sqrt{t}}3\sqrt{t}$$

$$\frac{\ln 3}{2\sqrt{t}}3\sqrt{t}$$

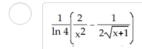
# Problem 5.

Find the derivative of the following function:

$$y = \log_4 \left( \frac{x^2}{6\sqrt{x+1}} \right)$$

[Hint: simplify the expression before taking the derivative]

Answers \*



 $e^{4} \left( \frac{6\sqrt{x+1}}{x^2} \right)$ 

 $\frac{1}{\ln 4} \left( \frac{2}{x} - \frac{1}{2(x+1)} \right)$ 

 $\frac{1}{\ln 4} \left( \frac{6\sqrt{x+1}}{x^2} \right)$ 

# Problem 6.

Find the derivative of the following function.

$$y = (\pi + 3)^x$$

Answers \*

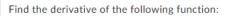


$$\ln(x)(\pi+3)^x$$

$$x(\pi+3)^{x-1}$$

$$(\pi+3)^x \ln(\pi+3)$$

## Problem 7.



$$y = x^e + e^x$$

Answers \*



$$x^e + xe^{x-1}$$



$$ex^{e-1} + e^x$$



$$x^e + e^x$$



$$ex^{e-1} + xe^{x-1}$$

# Problem 8.

Use logarithmic differentiation to find the derivative of the following function.

$$y = a^{\ln x}$$

Answers \*



$$\frac{a^{\ln(x)}}{x}$$

V

$$\frac{a^{\ln(x)}\ln(a)}{x}$$

$$(\ln(x) - 1)a^{\ln(x)}$$

 $x^{lna}$ 

## Problem 9.

Use logarithmic differentiation to find the derivative of y with respect to the independent variable.

$$y=a^{6x+9}$$
 for  $a>0$  and  $a\neq 1$ .

Answers \*



$$(6x+8)a^{6x+9}$$



$$6\ln(a)a^{6x+9}$$



$$(6x+9)\ln(a)$$

# Problem 10.

Find the derivative of y.

$$y = 9e^{x^2}$$

Answers \*



$$9x^2e^{x^2-1}$$



$$18xe^{x^2}$$



$$\ln(9)e^{x^2} + 9xe^{x^2 - 1}$$



$$9e^{x^2}$$

#### Problem 11.

bever	ling glass. In 2012, 34.1% of all glass containers were recycled. A age company used 400,000 lb of glass containers per year. After ing, the amount of glass, in pounds, still in use after t years is given by
	400000(0.341) <sup>r</sup>
Find	v′⊕
Note	that In(0.341) = -1.075873.
Answers *	
<b>✓</b>	$-430349.2(0.341)^t$
	$430349.2(0.341)^t$
	$-430349.2(0.651)^t$
	$400000t(0.341)^{t-1}$
robl	em 12.
incre resul raise	ulture. Farmers wishing to avoid the use of nonheirloom seeds are asingly concerned about inadvertently growing nonheirloom plants as t of pollen drifting from nearby farms. Assuming that these farmers their own seeds, the fractional portion of their crop that remains free nheirloom plants t years later can be approximated by
P(t) =	: 1.1(0.985) <sup>t</sup>
Find	P'(t).
Answers	
	$1.1t(0.985)^t$
	$1.0835(0.985)^t$
<b>✓</b>	$-0.016625(0.985)^t$
	$1.1(0.985)^t$

#### Problem 13.

Irma invested \$15,000 in a high-yield hedge fund, and after 14 years A (t) , her original investment has tripled. The exponential functions using base 3 and base e that give the value A of her account after t years is given  $\underline{by}$ 

 $A(t) = 15000 \times 3^{t/14}$ 

Find A'(t).

Answers \*



$$\frac{15000\ln(3)}{14}3^{t/14}$$

 $15000 \ln(3) 3^{t/14}$ 

 $\frac{15000}{14}3^{t/14}$ 

 $\frac{15000t}{14}3^{t/14}$ 

## Problem 14.

Find the derivative of

$$y = e^x \log_5(2x+1)$$

Answers \*

$$e^x \log_5(2x+1) + \frac{e^x}{2x+1}$$

 $\frac{2e^x}{(2x+1)\ln(5)}$ 

$$e^{x} \log_{5}(2x+1) + \frac{2e^{x}}{(2x+1)\ln(5)}$$

$$xe^{x-1}\log_5(2x+1) + \frac{\log(5)e^x}{2x+1}$$