# **Answer Key to Week #5 Assignment**

#### Problem 1.

Find the derivative of the following exponential function of  $\boldsymbol{x}$ .

$$y = e^7 - 10x$$

Answers \*



$$-10e^7 - 10x$$

$$\bigcirc$$
 7e<sup>7</sup> - 10x

#### Problem 2.

Find the derivative of the following function of x.

$$y = 8xe^X - 8e^X$$



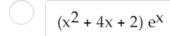
$$8xe^{X} + 16e^{X}$$

## Problem 3.

Find the derivative of the following function of x.

$$y = (x^2 - 2x + 4) e^X$$

Answers \*



$$(x^2 + 2) e^X$$

$$(2x-2)e^{X}$$

$$\left(\frac{x^3}{3} + 2x + 4\right) e^{x}$$

## Problem 4.

Find the derivative of the following function.

$$y = ln (x - 3)$$

$$\frac{1}{3-x}$$

$$\frac{1}{x-3}$$

$$\frac{1}{x+3}$$

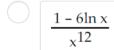
$$-\frac{1}{x+3}$$

## Problem 5.

Find the derivative of the following function.

$$y = \frac{\ln x}{x^6}$$

Answers \*



 $\frac{1 + 6 \ln x}{x^{12}}$ 

 $\frac{6\ln x - 1}{x^7}$ 

 $\frac{1 - 6 \ln x}{x^7}$ 

## Problem 6.

Find the derivative of the function.

$$y = \ln 9x^2$$

Answers \*

 $\frac{1}{2x+9}$ 

 $\sqrt{\frac{2}{x}}$ 

 $\frac{18}{x}$ 

#### Problem 7.

Find the derivative of the function.

$$y = \ln \frac{1 - x}{(x+5)^3}$$

Answers \*



$$\frac{2x-8}{(x+5)(1-x)}$$

$$\frac{(x+5)^3}{1-x}$$

$$\frac{2x-8}{(x+5)^4}$$

#### Problem 8.

Find the derivative of the function.

$$y = \ln \frac{1 + \sqrt{x}}{x^5}$$

Answers \*



$$\frac{10 - 9\sqrt{x}}{2x(1 + \sqrt{x})}$$

$$\frac{-10 - 9\sqrt{x}}{2(1 + \sqrt{x})}$$

~

$$\frac{-10 - 9\sqrt{x}}{2x(1 + \sqrt{x})}$$

# Problem 9.

Find the derivative of the function of

θ

 $y = \ln (10\theta e^{-\theta})$ 

Answers \*



$$\frac{1}{0}$$
 - 1

 $\frac{1}{100e^{\theta}}$ 

 $e^{\theta \left(\frac{1}{\theta} + 1\right)}$ 

In  $(10e^{-\theta}(1-\theta))$ 

## Problem 10.

Find the derivative of

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

Answers \*



 $\frac{2}{x}$ 

 $\frac{1}{x^2}$ 

 $2+rac{1}{x}$ 

 $\frac{1}{2x}$ 

## Problem 11.



$$y=\ln(\frac{1}{x})$$

Answers \*



 $\boldsymbol{x}$ 



-x



1-x



 $1-\frac{1}{x}$ 

# Problem 12.

Find the derivative of

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



$$x^e + e^x$$



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



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



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

## Problem 13.

It is reasonable for a manufacturer to expect the daily output of a new worker to be low at first, increase over time, and then level off. A manufacturer of LED flashlights determines that after t workdays, the number of flashlights produced per day by the average worker can be modeled by

$$N(t) = 80 - 70e^{-0.1t}$$

Find the derivative of N(t).

Answers\*  $-70e^{-0.1t}$   $7e^{-0.1t}$   $-0.7e^{-0.1t}$   $7te^{-0.1t}$ 

#### Problem 14.

Marginal cost. The total cost, in millions of dollars, for Greenleaf Construction is given by

$$C(x) = 100 - 50e^{-x}$$

where x is the number of houses built. Find the **marginal cost function** (i.e., the derivative of C(x).



$$50e^{-x}$$



$$50xe^{-x}$$



$$50xe^{-x-1}$$



$$-50e^{-x}$$

## Problem 15.

Marginal profit. The profit, in thousands of dollars, from the sale of  $\boldsymbol{x}$  thousand candles can be estimated by

$$P(x) = 2x - 0.3x \ln x$$

Find the marginal profit function. (Hint: the marginal profit is the derivative of the profit function)



$$P'(x) = 1.7 - 0.3 \ln x$$



$$P'(x) = 1.7$$



$$P'(x) = 2 - 0.3 \ln x$$



$$P'(x) = 2x - 0.3 \ln x$$