Principles of Calculus Modeling: An Interactive Approach by Donald Kreider, Dwight Lahr, and Susan Diesel
Exercises for Section 2.12

1. (1 pt)
Differentiate $y = 8xe^{-4x} - 6x - 6$. Simplify your answer when possible. Your answer should be in terms of x.
$y' =$ _____

2. (1 pt)
Differentiate $y = \ln(5 + 8^x)$. Simplify your answer when possible. Your answer should be in terms of x.
$y' =$ _____

3. (1 pt)
Differentiate $f(x) = e^{4x^2-6x+9}$. Simplify your answer when possible. Your answer should be in terms of x.
$f'(x) =$ _____

4. (1 pt)
Differentiate $f(x) = 9e^{\ln(x)}$. Simplify your answer when possible. Your answer should be in terms of x.
$f'(x) =$ _____

5. (1 pt)
Differentiate $y = 9(\cos(x))^{\sin(x)} + 2(\sin(x))^{\cos(x)}$. Simplify your answer when possible. Your answer should be in terms of x.
$y' =$ _____

6. (1 pt)
Let $f = xe^{-4x}$. Determine where f is increasing and where it is decreasing.

In the answer boxes below, enter up to three intervals, from left to right. For each interval, indicate whether the function is increasing or decreasing by entering **I** or **D** in the third appropriate answer box. Use only the answer boxes that you need. Type **-infinity** for $-\infty$ or **infinity** for ∞, without quotes.

first interval:
_____ to _____ increasing/decreasing: ___
second interval:
_____ to _____ increasing/decreasing: ___
third interval:
_____ to _____ increasing/decreasing: ___

7. (1 pt)
Let $e^{rxy} \ln \frac{x}{y} = x + \frac{1}{y}$, where y is a function of x. If the curve $e^{rxy} \ln \frac{x}{y} = x + \frac{1}{y}$ passes through the point $\left(8, \frac{1}{8}\right)$, what is r?
$r =$ _____

Suppose $r = 1$ and the curve passes through the point $\left(e, \frac{1}{e}\right)$. Find the slope of the curve at this point.
slope = _____

8. (1 pt)
For the function $-1xe^{xy} = 6$, calculate both $\frac{dy}{dx}$ and $\frac{dx}{dy}$.
$\frac{dy}{dx} =$ _____
$\frac{dx}{dy} =$ _____

9. (1 pt)
Let $f(x) = 13xe^x + 3$. At what values of x does f have a local or absolute maximum or minimum? Leave unused answer boxes blank.
local maximum at $x =$ _____
absolute maximum at $x =$ _____
local minimum at $x =$ _____
absolute minimum at $x =$ _____

10. (1 pt)
Write the equation of the line tangent to $y = e^x$ at $x = 9$.
$L(x) =$ _____
What is the x-intercept of this line?
_____