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 \( y = \ln(5 + 8e^x) \). 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 \(-\infty\) for \(-\infty\) or \(\infty\) for \(\infty\), without quotes.

- first interval: ___________ to ___________ increasing/decreasing: ___________ to ___________ increasing/decreasing: ___________

- second interval: ___________

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

\[ r = \]

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

\[ \text{slope} = \]

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?

\[ \]

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