Instructions
Read today’s Notes and Learning Goals

1. Question Details

Read today’s Notes and Learning Goals. Which of the following statements are true about the quick derivative rules? Select all that apply.

- You will be tested on the quick derivative rules.
- You can use notes/formula sheets when tested on the derivative rules.
- You should practice the rules without using a calculator/computer.
- The only way to see all possible examples is to practice another version.
- You can use a calculator when tested on the derivative rules.

2. Question Details

Find the following basic derivative. Any letter other than $x$ is a constant.

$$\frac{d}{dx}(Ae^x) =$$

Practice another version to see all basic derivatives.

3. Question Details

Learn the new derivative rules.

a. $$\frac{d}{dx}(\sin(x)) =$$
b. $$\frac{d}{dx}(\cos(x)) =$$
c. $$\frac{d}{dx}(\ln(x)) =$$

4. Question Details

Find the derivative of the following linear combination.

$$\frac{d}{dx}(12\sin(x) + 10e^x - 11\ln(x)) =$$

Practice another version to see more examples.
5. **Question Details**

Find the derivative of the following linear combination.

\[
\frac{d}{dx}\left(D\ln(x) + Be^x - \frac{a}{x^2}\right) = \underline{\quad}\n\]

Any letter other than \(x\) is a constant.

*Practice another version* to see more examples.

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6. **Question Details**

Consider the function \(f(x) = \frac{6}{\sqrt{x}}\). Find the equation of the tangent line at \(x = 4\) by following the steps below.

a. What is the slope of the tangent line at \(x = 4\)?

Slope = \underline{\quad}\n
b. The tangent line must touch the curve at \(x = 4\). What is the point, \((x, y)\), where the tangent line touches the curve? Enter in the answer as a point '\((x-value, y-value)\)'.

Point = \((x_1, y_2) = \underline{\quad}\n
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7. **Question Details**

Consider the function \(f(x) = \ln(x)\). Find the equation of the tangent line at \(x = 1\) by following the steps below.

a. What is the slope of the tangent line at \(x = 1\)?

Slope = \underline{\quad}\n
b. The tangent line must touch the curve at \(x = 1\). What is the point, \((x, y)\), where the tangent line touches the curve? Enter in your answer using correct notation for a point.

Point = \underline{\quad}\n
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8. Question Details

Consider the function \( f(x) = 5\cos(x) - 3\sin(x) \). Find the equation of the tangent line at \( x = \pi \) by following the steps below.

a. What is the slope of the tangent line at \( x = \pi \)?

Slope = 

b. The tangent line must touch the curve at \( x = \pi \). What is the point, \((x, y)\), where the tangent line touches the curve? Enter in the exact point. Use \( \pi \) as needed. Do not use decimals.

Point = 

c. Find the equation for the tangent line at \( x = \pi \), using the slope and point found above. Enter in the exact equation, use \( \pi \) as needed, no decimals.

\[ f(x) = 5\cos(x) - 3\sin(x) \]

9. Question Details

Consider the function \( f(x) = 5\sin(x) + 9\cos(x) \). Find the equation of the tangent line at \( x = 0 \).

Enter in numbers using exact formulas, no decimals.

**Practice another version** to see more examples.
Suppose the derivative of a function is given as
\[ \frac{df}{dx} = \sin(x) + \cos(x) \]

a. Four students guess what the original function \( f \) is. Check each student's guess by writing its derivative.

- **Alice** guesses that \( f(x) = \cos(x) + \sin(x) \).
  
  Check:

- **Bob** guesses that \( f(x) = \cos(x) - \sin(x) \).
  
  Check:

- **Chris** guesses that \( f(x) = -\cos(x) + \sin(x) \).
  
  Check:

- **Dani** guesses that \( f(x) = -\cos(x) - \sin(x) \).
  
  Check:

b. Which of the four students was correct?

- Alice
- Bob
- Chris
- Dani
Suppose the derivative of a function is given as
\[ \frac{df}{dx} = \frac{1}{x} \]
Four students guess what the original function \( f \) is. Check each student's guess by writing its derivative.

- Alice guesses that \( f(x) = \frac{-1}{x^2} \).
  
  Check: 

- Bob guesses that \( f(x) = \ln(x) \).
  
  Check: 

- Chris guesses that \( f(x) = x^{-1} \).
  
  Check: 

- Dani guesses that \( f(x) = \ln(2x) = \ln(2) + \ln(x) \).
  
  Check: 

Which of the four students was correct? Select all that apply.

- Alice
- Bob
- Chris
- Dani
12. Question Details

Suppose the derivative of a function is given as
\[ \frac{df}{dx} = 150 - 150e^x \]

Four students guess what the original function \( f \) is. Check each student’s guess by writing its derivative.

- **Alice** guesses that \( f(x) = 150x - 150e^x \).
- **Bob** guesses that \( f(x) = -150e^x \).
- **Chris** guesses that \( f(x) = 150 + 150x - 150e^x \).
- **Dani** guesses that \( f(x) = 150x - 150e^x + C \) where \( C \) is any constant.

Which of the four students was correct? Select all that apply.

- [ ] Alice
- [ ] Bob
- [ ] Chris
- [ ] Dani

13. Question Details

Suppose the derivative of a function is given as
\[ \frac{df}{dx} = \frac{10}{\sqrt{x}} \]

A student guesses an antiderivative
\[ f(x) = 20\sqrt{x} \]

a. Is this student's guess correct?

- [ ] Yes
- [ ] No

b. Is this student's answer the only possible answer?

- [ ] Yes
- [ ] No

c. If there is another correct answer, enter such an answer in the box below. If the student's guess is the only correct answer, enter NONE.
14. Question Details

The derivative of a function is given below.

\[ \frac{df}{dx} = \sin(x) \]

Find any function that satisfies the above derivative.

\[ f(x) = \]

Practice another version to see more examples.

15. Question Details

The derivative of a function is given below.

\[ \frac{df}{dx} = -\frac{8}{x} - 14e^x \]

Find any function that satisfies the above derivative.

\[ f(x) = \]

Practice another version to see more examples.