Find the derivative of the function.
1) \( y = \ln 4x \)
2) \( y = \log (7x) \)

Find the derivative.
3) \( y = 4e^{x^2} \)

Decide whether the limit exists. If it exists, find its value.
4) \( \lim_{x \to -1/2} f(x) \)

5) Find the limit of \( f(x) \) as \( x \) approaches 1 from the left.
\[ f(x) = \begin{cases} 
2 & \text{if } x < 1 \\
 x + 3 & \text{if } 1 \leq x \leq 3 \\
 6 & \text{if } x > 3 
\end{cases} \]

Find all points where the function is discontinuous.
6)

Find all values \( x = a \) where the function is discontinuous.
7) \( g(x) = \begin{cases} 
0 & \text{if } x < 0 \\
x^2 - 3x & \text{if } 0 \leq x \leq 3 \\
3 & \text{if } x > 3 
\end{cases} \)

8) Find the instantaneous rate of change for the function \( f(x) = 5x^2 + x \) at \( x = -4 \).

9) Suppose that the unit price, \( p \), for \( x \) units of a product can be illustrated by the given graph. Find each limit, if it exists:
\[
\lim_{x \to 50^-} p(x), \quad \lim_{x \to 50^+} p(x), \quad \lim_{x \to 50} p(x), \quad \lim_{x \to 75} p(x)
\]

Find the x-values where the function does not have a derivative.
10)

Find the average rate of change for the function over the given interval.
11) \( y = 5x + 7 \) between \( x = -1 \) and \( x = 0 \)

Find \( f(x) \) when \( x \) has the given value.
12) \( f(x) = \sqrt{x}; \ x = 121 \)

Find an equation for the line tangent to given curve at the given value of \( x \).
13) \( y = x - x^2 \) at \( x = -1 \)
Estimate the slope of the tangent line to the curve at the given point.

14) The graph shows the average cost of a barrel of crude oil for the years 1981 to 1990 in constant 1996 dollars. Find the approximate average change in price from 1981 to 1987.

17) The graph shows the average change in price from 1981 to 1987.

The graphs of a function $f(x)$ and its derivative $f'(x)$ are shown below. Decide which is the graph of $f(x)$ and which is the graph of $f'(x)$.

15)

18) At what points on the graph of $f(x) = 2x^3 - 3x^2 - 33x$ is the slope of the tangent line 3?

19) Use a graphing calculator to find $f'(x)$ when $x$ has the given value.

19) $f(x) = x^{5/3}; x = 3$

Find the slope of the line tangent to the graph of the function at the given value of $x$.

20) $y = \frac{7}{x} - \sqrt{x}; x = 4$

Find all values of $x$ (if any) where the tangent line to the graph of the function is horizontal.

21) $y = x^3 - 12x + 2$

16) If $g'(4) = -4$ and $h'(4) = -6$, find $f'(4)$ for $f(x) = -2g(x) + 2h(x) + 2$. 

1) \( \frac{1}{x} \)

2) \( \frac{1}{x(\ln 10)} \)

3) 8xe

4) −1

5) 2

6) None

7) 3

8) −39

9) 10; 8; does not exist; 8

10) \( x = 0, x = 3 \)

11) 5

12) \( \frac{1}{22} \)

13) \( y = 3x + 1 \)

14) 1/2

15) \( f(x) \) is the dashed line; \( f'(x) \) is the solid line.

16) 0

17) About −$7/year

18) (−2, 38), (3, −72)

19) −0.3419

20) \( −\frac{11}{16} \)

21) 2, −2