

Practice 3. Derivative.

Business Calculus

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find average rate of change for the function over the given interval.

1) $y = x^2 + 6x$ between $x = 4$ and $x = 8$ 1) _____
A) 9 B) 14 C) 18 D) 28

2) Find the average rate of change for $f(x) = \sqrt{2x}$ if x changes from 2 to 8. 2) _____
A) 2 B) $\frac{1}{3}$ C) 7 D) $-\frac{3}{10}$

Find the instantaneous rate of change for the function at the value given.

3) Find the instantaneous rate of change for the function $x^2 + 7x$ at $x = 8$. 3) _____
A) 15 B) 23 C) 16 D) 120

4) Find the instantaneous rate of change for the function $f(x) = 5x^2 + x$ at $x = -4$. 4) _____
A) -41 B) 6 C) -14 D) -39

Provide an appropriate response.

5) Use the four step process to find $f'(x)$ for the function $f(x) = 5x^2 - 3x$. 5) _____
A) $10x + 5h - 3$ B) $5h^2 - 3h$ C) $10x - 3$ D) $5h - 3$

6) Use the four step process to find $f'(x)$ for the function $f(x) = \frac{2}{x^2}$. 6) _____
A) $-\frac{2(h+2x)}{x^2(x+h)^2}$ B) $-\frac{2(h+2x+hx)}{x^2(x+h)^2}$
C) $\frac{(h+2x)}{x^2(x+h)^2}$ D) $\frac{2(h+x)}{x^2(x+h)^2}$

7) Find the slope of the secant line joining $(2, f(2))$ and $(3, f(3))$ for $f(x) = -3x^2 - 8$. 7) _____
A) -15 B) 15 C) 55 D) -55

8) Find the slope of the graph $f(x) = -x^2 + 3x$ at the point $(1, 2)$. 8) _____
A) 2 B) -1 C) 1 D) -2

9) Find the slope of the line tangent to the graph of the function at the given value of x . 9) _____
 $y = x^4 + 2x^3 + 2x + 2$ at $x = -3$
A) -50 B) -52 C) 65 D) 67

Solve the problem.

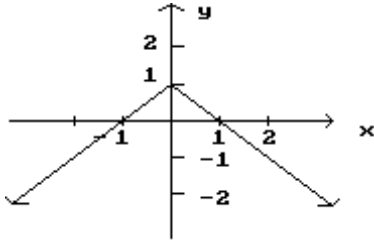
10) Suppose an object moves along the y -axis so that its location is $y = f(x) = x^2 + x$ at time x (y is in meters and x is in seconds). Find the average velocity (the average rate of change of y with respect to x) for x changing from 2 to 9 seconds. 10) _____
A) 84 m/s B) 15 m/s C) 12 m/s D) 3 m/s

- 11) Suppose an object moves along the y-axis so that its location is $y = f(x) = x^2 + x$ at time x (y is in meters and x is in seconds). Find the average velocity for x changing from 3 to $3 + h$ seconds. 11) _____
- A) $12 + h$ m/s B) $7 - h$ m/s C) $7 + h$ m/s D) $12 - h$ m/s

- 12) Suppose an object moves along the y-axis so that its location is $y = f(x) = x^2 + x$ at time x (y is in meters and x is in seconds). Find the instantaneous velocity at $x = 4$ seconds. 12) _____
- A) 8 m/s B) 10 m/s C) 20 m/s D) 9 m/s

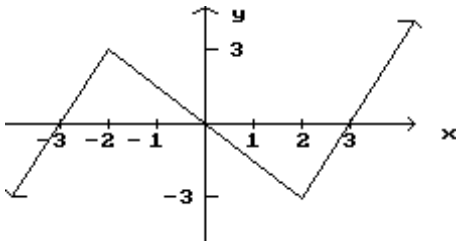
List the x-values in the graph at which the function is not differentiable.

- 13) _____ 13) _____



- A) $x = -1$ B) $x = 0$ C) $x = 2$ D) $x = 1$

- 14) _____ 14) _____



- A) $x = -3, x = 0, x = 3$ B) $x = -2, x = 0, x = 2$
 C) $x = -2, x = 2$ D) $x = -3, x = 3$

Solve the problem.

- 15) If an object moves along a line so that it is at $y = f(x) = 3x^2 - 2x + 5$ at time x (in seconds), find the instantaneous velocity function $v = f'(x)$. 15) _____
- A) $3x - 2$ B) $3x^2 - 2$ C) $6x^2 - 2$ D) $6x - 2$

- 16) If an object moves along a line so that it is at $y = f(x) = 8x^2$ at time x (in seconds), find the velocity at $x = 1$ (y is measured in feet). 16) _____
- A) 6 ft/sec B) 8 ft / s C) 16 ft / s D) 160 ft/s

Provide an appropriate response.

- 17) Find the derivative of $y = \frac{3x^5 - 7x^2 - 4}{x^2}$. 17) _____

- A) $y' = 9x^{-2} + 8x^{-3}$ B) $y' = 9x^2 + 8x^{-3}$
 C) $y' = 18x^2 + 8x^{-3}$ D) $y' = 9x^2 + 8x^3$

- 18) Let f and g be functions that satisfy $f'(4) = 2$ and $g'(4) = -3$. Find $h'(4)$ for $h(x) = 3f(x) - g(x) + 2$. 18) _____
- A) 5 B) 2 C) 11 D) 9

- 19) Find $f'(x)$ if $f(x) = 3x^4 + 6x^7$. 19) _____
 A) $4x^3 + 7x^6$ B) $3x^5 + 7x^8$ C) $12x^3 + 42x^6$ D) $7x^3 + 13x^6$
- 20) Find $\frac{dy}{dx}$ for $y = \frac{1}{3x^3} + \frac{x^7}{10}$. 20) _____
 A) $\frac{7x^6}{9x^2 + 10}$ B) $-x^{-4} + \frac{7}{10}x^6$ C) $-x^{-2} + \frac{7}{10}x^7$ D) $\frac{1}{9x^2} + \frac{7x^6}{10}$
- 21) Find the equation of the tangent line at $x = 7$ for $f(x) = 6 - x^2$. Write the answer in the form $y = mx + b$. 21) _____
 A) $y = 7x + 55$ B) $y = -2x$ C) $y = 14x - 55$ D) $y = -14x + 55$
- 22) Find the equation of the tangent line at $x = -6$ for $f(x) = \frac{x^3}{2}$. Write the answer in the form $y = mx + b$. 22) _____
 A) $y = 216x + 18$ B) $y = 18x + 216$ C) $y = 216x + 54$ D) $y = 54x + 216$
- 23) Find the values of x where the tangent line is horizontal for $f(x) = 3x^3 - 2x^2 - 9$. 23) _____
 A) $x = 0, x = \frac{4}{9}$ B) $x = 0, x = \frac{2}{3}$ C) $x = 0, x = -\frac{2}{3}$ D) $x = 0, x = -\frac{4}{9}$

Solve the problem.

- 24) An object moves along the y -axis (marked in feet) so that its position at time t (in seconds) is given by $f(t) = 9t^3 - 9t^2 + t + 7$. Find the velocity at three seconds. 24) _____
 A) 109 feet per second B) 197 feet per second
 C) 190 feet per second D) 192 feet per second

Provide an appropriate response.

- 25) Suppose that the total profit in hundreds of dollars from selling x items is given by $P(x) = 4x^2 - 5x + 10$. Find the marginal profit at $x = 5$. 25) _____
 A) \$32 B) \$35 C) \$45 D) \$15
- 26) The revenue (in thousands of dollars) from producing x units of an item is modeled by $R(x) = 5x - 0.0005x^2$. Find the marginal revenue at $x = 1000$. 26) _____
 A) \$4.50 B) \$4.00 C) \$104.00 D) \$10,300.00

