

Complete the following questions to the best of your ability. Points for each question is marked.

Use the definition $f'(a) = \lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}$ or $f'(a) = \lim_{h \rightarrow 0} \frac{f(a + h) - f(a)}{h}$ to find the derivative of the given function at the indicated point.

Points: 4

1) $f(x) = 12x^2 + 11x$, $a = 8$

Solve the problem.

Points: 3

2) If $y = x^3 - 9x + 5$, find an equation of the tangent line to the graph of y at $x = 3$.

If the function is not differentiable at the given value of x , tell whether the problem is a corner, cusp, vertical tangent, or a discontinuity. (INCLUDE A SKETCH OF GRAPH)

Points: 2

3) $y = \frac{-3}{x + 1}$, at $x = -1$

If the function is not differentiable at the given value of x , tell whether the problem is a corner, cusp, vertical tangent, or a discontinuity. (INCLUDE A SKETCH OF GRAPH)

Points: 2

4) $y = \sqrt[3]{|x + 7|}$, at $x = -7$

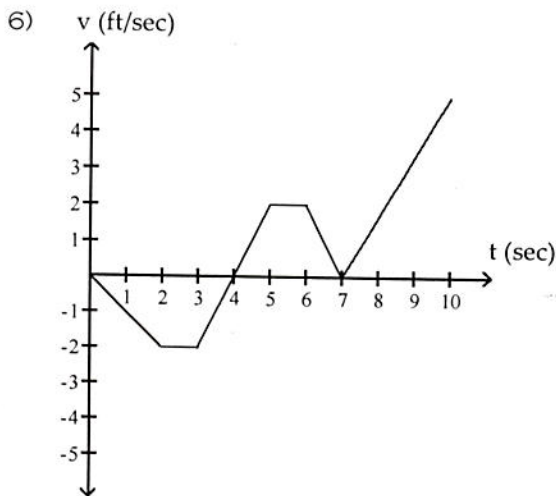
Solve the problem.

Points: 3

- 5) Given the distance function $s(t) = t^2 + 9t + 20$, where s is in feet and t is in seconds, find the velocity function, $v(t)$, and the acceleration function, $a(t)$.

The figure shows the velocity v of a body moving along a coordinate line as a function of time t . Use the figure to answer the question.

Points: 2

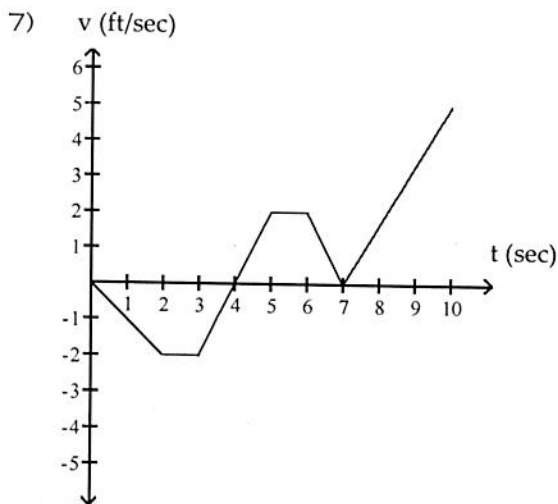


When is the body's acceleration equal to zero?

- A) $2 < t < 3, 5 < t < 6$
C) $0 < t < 2, 6 < t < 7$

- B) $t = 0, t = 4, t = 7$
D) $t = 2, t = 3, t = 5, t = 6$

Points: 2



When does the body reverse direction?

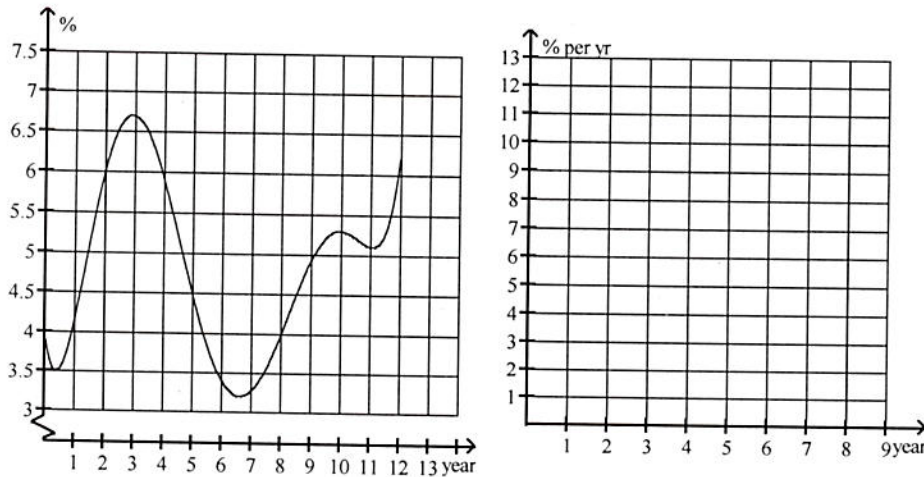
- A) $t = 4, t = 7$ sec
C) $t = 4$ sec

- B) $t = 2, t = 3, t = 5, t = 6, t = 7$ sec
D) $t = 7$ sec

Solve the problem.

Points: 2

- 8) The graph shows the yearly average interest rates for 30-year mortgages for years since 1988 (Year 0 corresponds to 1988). Sketch a graph of the rate of change of interest rates with respect to time.



Points: 3

- 9) The function $V = s^3$ describes the volume of a cube, V , in cubic inches, whose length, width, and height each measure s inches. Find the (instantaneous) rate of change of the volume with respect to s when $s = 2$ inches.

Points: 3

- 10) $2x^2y - \pi \cos y = 3\pi$, Use Implicit Differentiation to compute the slope at $(1, \pi)$

Solve the problem.

Points: 3

- 11) The nationwide attendance per day for a certain motion picture can be approximated using the equation $A(t) = 15t^2e^{-t}$, where A is the attendance per day in thousands of persons and t is the number of months since the release of the film. Compute the rate of change of the daily attendance after 4 months and interpret what this means in the context of the question.

Answer Key

Testname: CALCT3PARTHOME

1) 203

ID: CALC3DF 3.1.2-1+

Points: 4

Objective: (3.1) Find Derivative at Point Using Alternate Definition

2) $y = 18x - 49$

ID: CALC3DF 3.1.5-5+

Points: 3

Objective: (3.1) Find Equation of Tangent Line at Given Point

3) discontinuity

ID: CALC3DF 3.2.2-2+

Points: 2

Objective: (3.2) Classify Differentiability Problems

4) cusp

ID: CALC3DF 3.2.2-4

Points: 2

Objective: (3.2) Classify Differentiability Problems

5) $v(t) = 2t + 9$; $a(t) = 2$

ID: CALC3DF 3.4.4-1+

Points: 3

Objective: (3.4) Solve Apps: Motion

6) A

ID: CALC3DF 3.4.3-1

Points: 2

Objective: (3.4) Analyze Motion Depicted in Graph

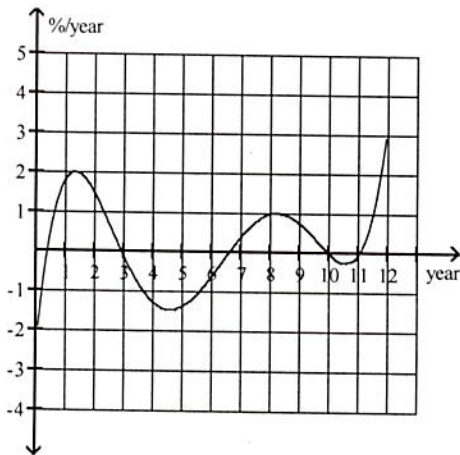
7) C

ID: CALC3DF 3.4.3-3

Points: 2

Objective: (3.4) Analyze Motion Depicted in Graph

8)



ID: CALC3DF 3.1.7-1+

Points: 2

Objective: (3.1) Solve Apps: Graphical Differentiation

9) $12 \text{ in}^3/\text{in.}$

ID: CALC3DF 3.4.1-1+

Points: 3

Objective: (3.4) Find Instantaneous Rates of Change

10) -2π

ID: CALC3DF 3.7.2-1+

Points: 3

Objective: (3.7) Find Slope, Tangent Line, or Normal Line

11) -2.198 thousand persons/day \cdot month; the daily attendance is decreasing.

ID: CALC3DF 3.9.5-2+

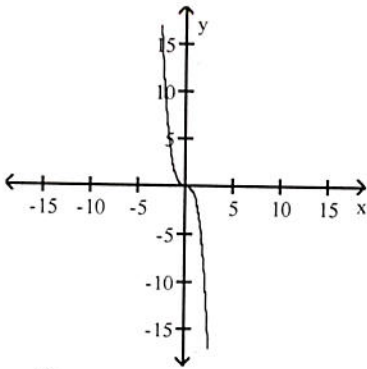
Points: 3

Objective: (3.9) Solve Apps: Derivatives of Exponential and Logarithmic Functions

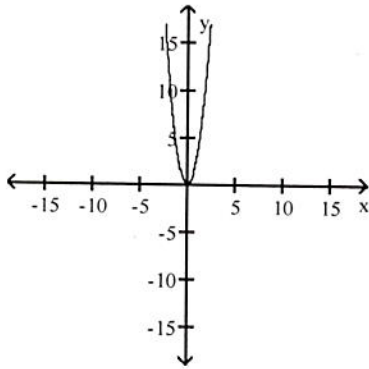
Complete the following questions to the best of your ability. Points for each question is marked.

The graph of a function is given. Choose the answer that represents the graph of its derivative

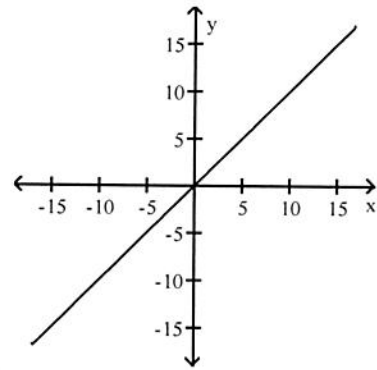
1)



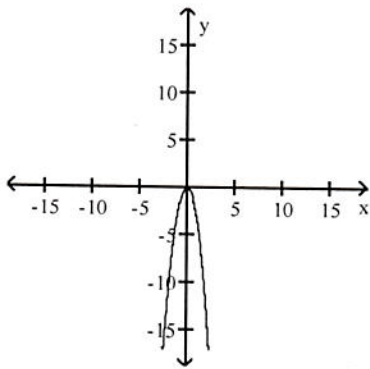
A)



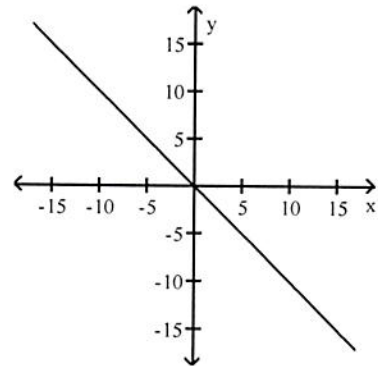
B)



C)



D)



Solve the problem.

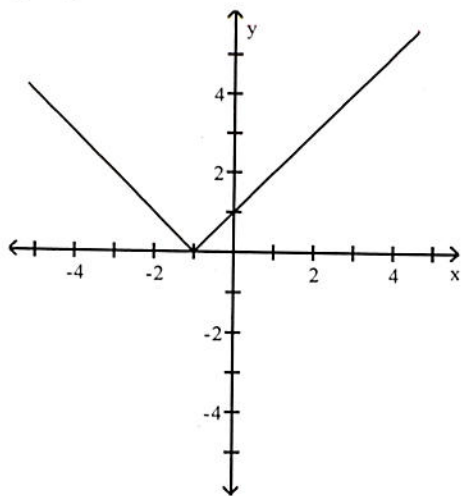
2) Find $f'(x)$ if $f(x) = 14x - 22$.

Find the slope of the line tangent to the curve at the given value of x

3) $y = -9x^2 + 9x$; $x = 6$

The figure shows the graph of a function. At the given value of x , does the function appear to be differentiable continuous but not differentiable, or neither continuous nor differentiable?

4) $x = -1$



- A) Differentiable
- B) Continuous but not differentiable
- C) Neither continuous nor differentiable

Find dy/dx .

5) $y = \frac{6}{\sin x}$

Find the indicated derivative.

6) Find y'' if $y = -8 \cos x$.

Find dy/dx .

7) $y = x^6 \cos x - 11x \sin x - 11 \cos x$

Find dy/dx by implicit differentiation.

8) $9y + -8xy - 7 = 0$

9) $x^3 = \cot y$

Find the derivative of the given function.

10) $y = 2 \sin^{-1} (4x^3)$

Find dy/dx .

11) $y = \ln 7x^2$

12) $y = 2^x$

Answer Key

Testname: CALCT3INCLASS

1) C

ID: CALC3DF 3.1.4-5

Points: 1

Objective: (3.1) Match Graph of Function with Graph of Derivative

2) $f'(x) = 14$

ID: CALC3DF 3.1.3-1+

Points: 1

Objective: (3.1) Find Derivative of Function

3) -99

ID: CALC3DF 3.3.6-1

Points: 1

Objective: (3.3) Find Slope of Tangent Line at Point

4) B

ID: CALC3DF 3.2.1-3

Points: 1

Objective: (3.2) Determine if Function Differentiable/Continuous at Point

5) $-6 \csc x \cot x$

ID: CALC3DF 3.5.1-4+

Points: 1

Objective: (3.5) Find Derivative of Trigonometric Function I

6) $y'' = 8 \cos x$

ID: CALC3DF 3.5.3-2+

Points: 1

Objective: (3.5) Find Higher-Order Derivative of Trigonometric Function

7) $-x^6 \sin x + 6x^5 \cos x - 11x \cos x$

ID: CALC3DF 3.5.1-5+

Points: 1

Objective: (3.5) Find Derivative of Trigonometric Function I

8) $\frac{8y}{9 + -8x}$

ID: CALC3DF 3.7.1-4+

Points: 1

Objective: (3.7) Find dy/dx by Implicit Differentiation

9) $-\frac{3x^2}{\csc^2 y}$

ID: CALC3DF 3.7.1-5+

Points: 1

Objective: (3.7) Find dy/dx by Implicit Differentiation

10) $\frac{24x^2}{\sqrt{1 - 16x^6}}$

ID: CALC3DF 3.8.1-1+

Points: 1

Objective: (3.8) Find Derivative of Inverse Trig Function

11) $\frac{2}{x}$

ID: CALC3DF 3.9.2-3+

Points: 1

Objective: (3.9) Find Derivative of Logarithmic Function

12) $2^x \ln 2$

ID: CALC3DF 3.9.1-8

Points: 1

Objective: (3.9) Find Derivative of Exponential Function