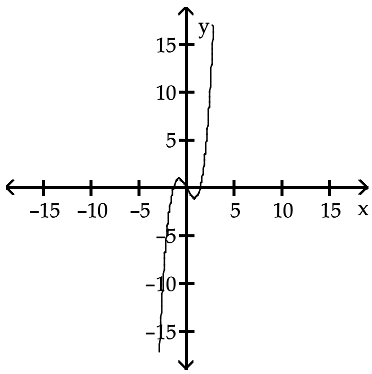
Exam

Name________________________________

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

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

1) 1)



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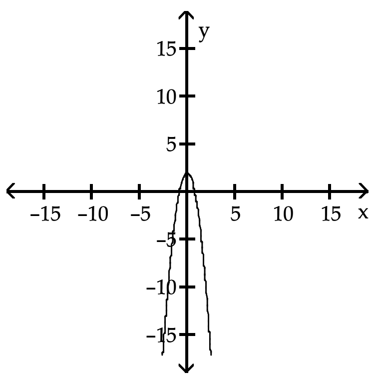

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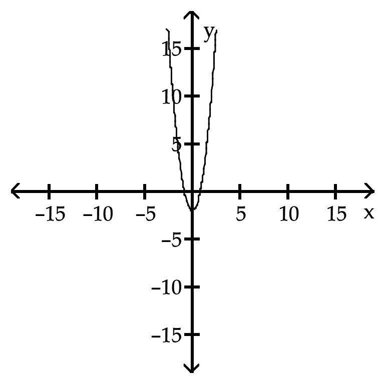

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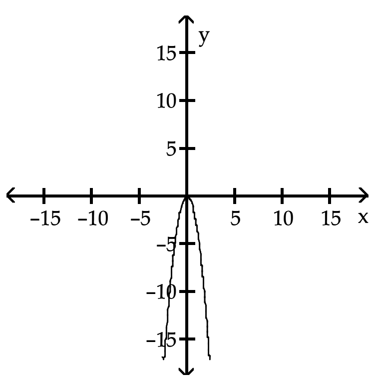

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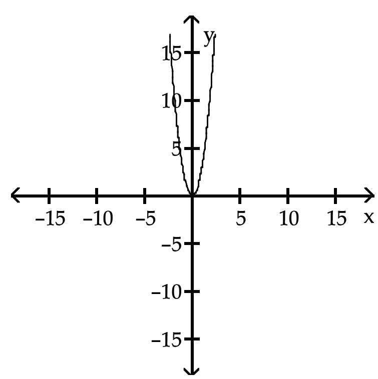

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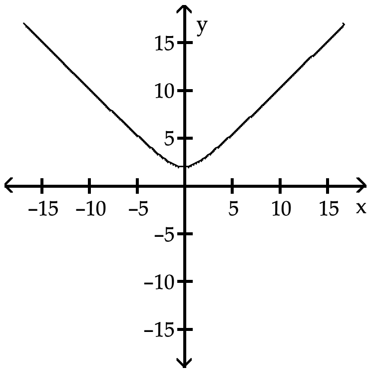

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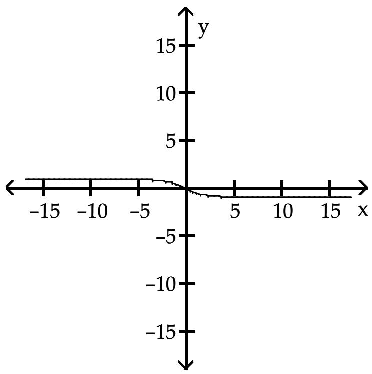
A)



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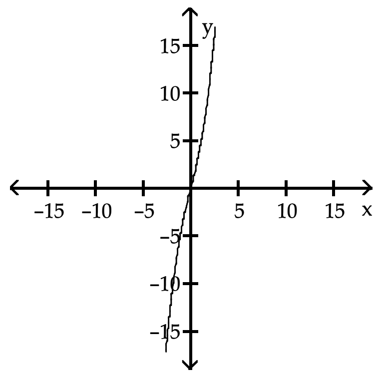

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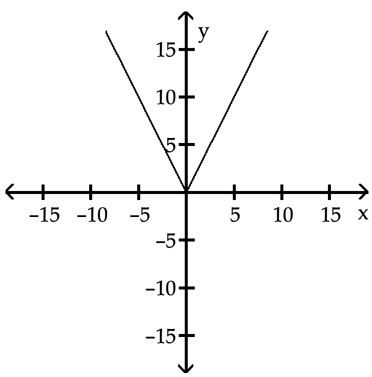

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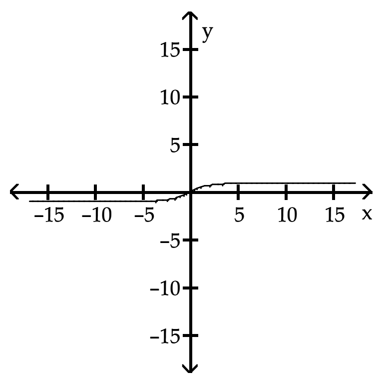

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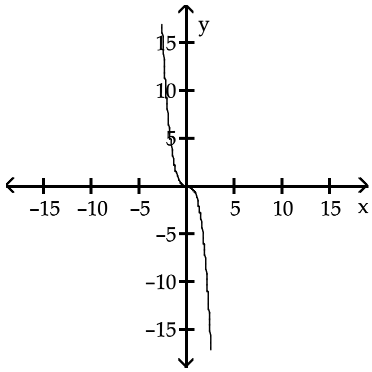
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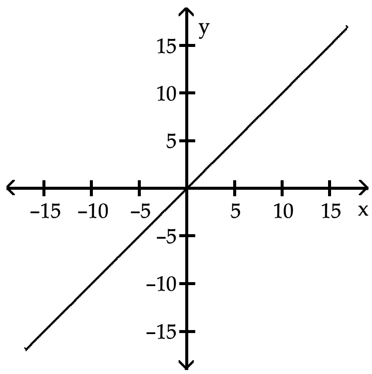
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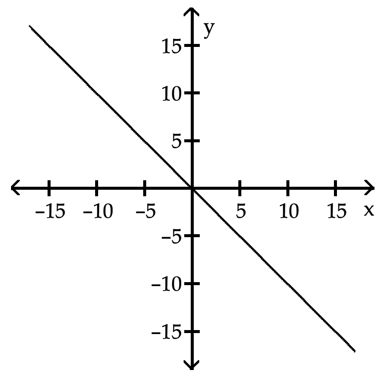
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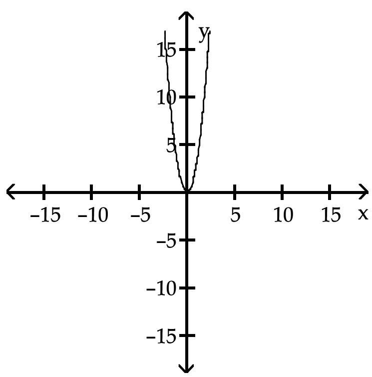
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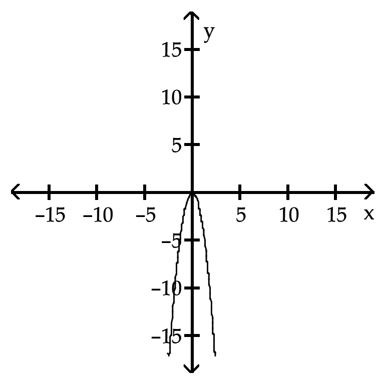
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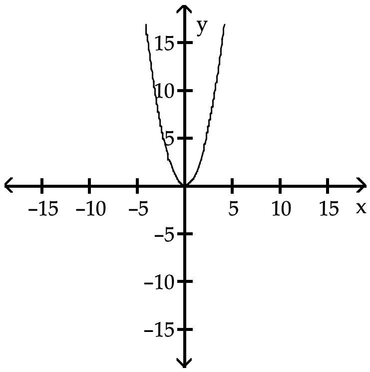

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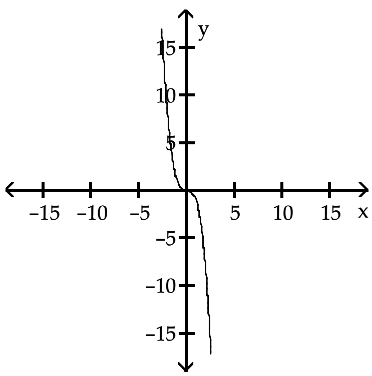

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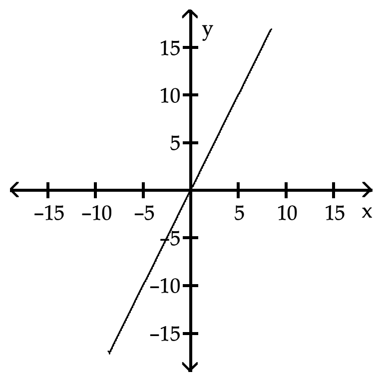

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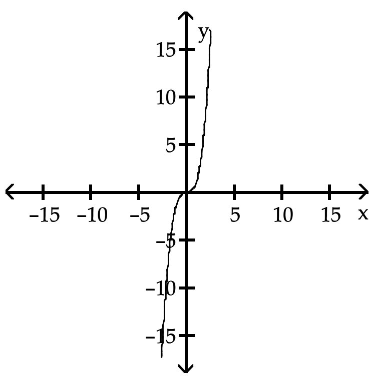

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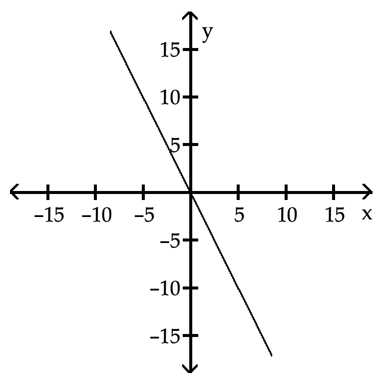

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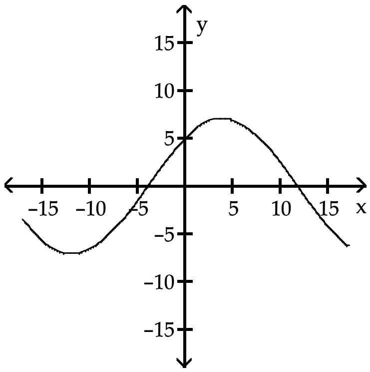

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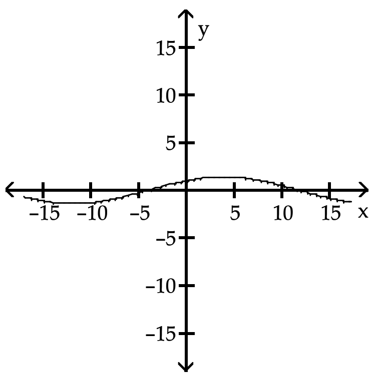

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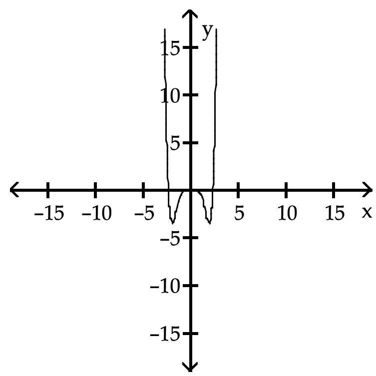

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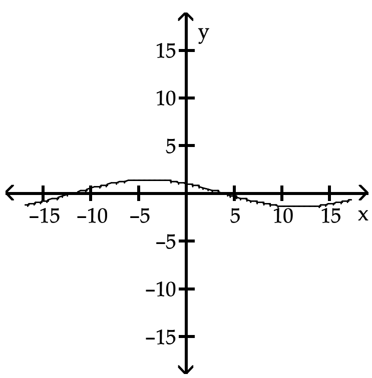

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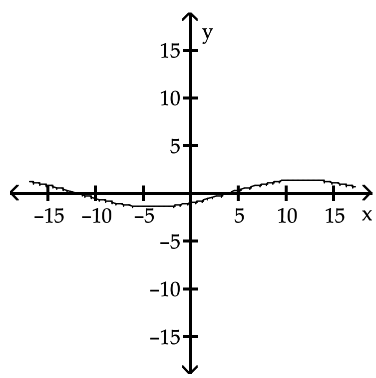

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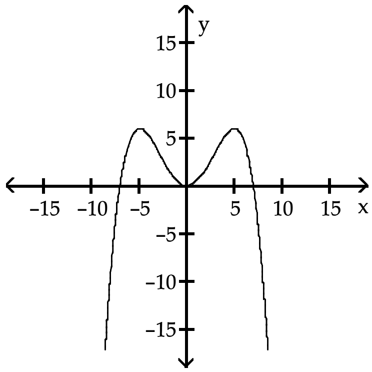
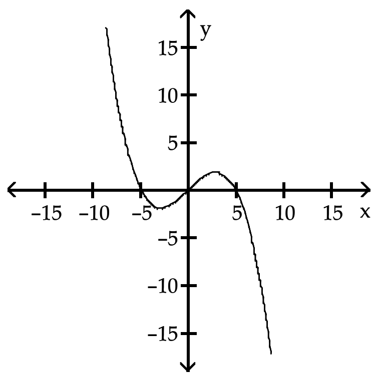


A)



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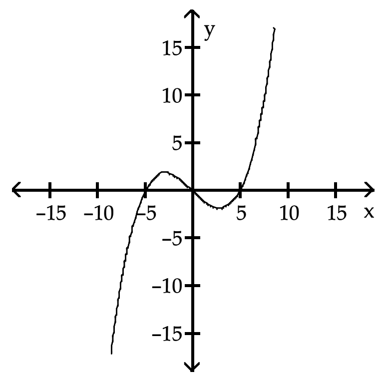

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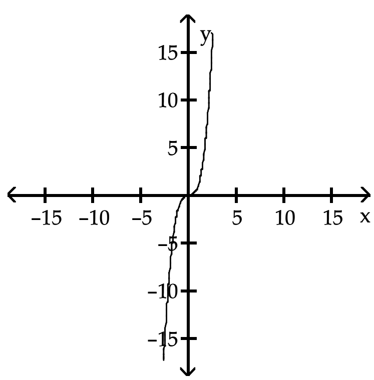

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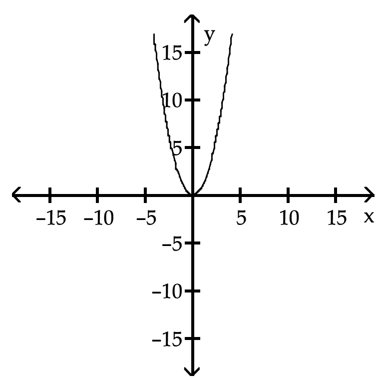


SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

7) Find ds/dt when $\theta = \pi/4$ if $s = \sin \theta$ and $d\theta/dt = 10$. 7)

Solve the problem.

8) Let $Q(x) = b_0 + b_1(x - a) + b_2(x - a)^2$ be a quadratic approximation to $f(x)$ at $x = a$ with the properties: 8)

i. $Q(a) = f(a)$

ii. $Q'(a) = f'(a)$

iii. $Q''(a) = f''(a)$

(a) Find the quadratic approximation to $f(x) = \dfrac{1}{3 + x}$ at $x = 0$.

(b) Do you expect the quadratic approximation to be more or less accurate than the linearization? Give reasons for your answer.

Provide an appropriate response.

9) What is wrong with the following? 9)

$y = (x^3)(x^5)$

$\frac{dy}{dx} = (3x^2)(5x^4) = 15x^6$

What is the correct derivative?

10) Find $\frac{d}{dx}(x^{9/2})$ by rewriting $x^{9/2}$ as $x^4 \cdot x^{1/2}$ and using the Product Rule. 10)

11) Can a tangent line to a graph intersect the graph at more than one point? If not, why not. If so, give an example. 11)

12) Is there anything special about the tangents to the curves $xy = 1$ and $x^2 - y^2 = 1$ at their point of intersection in the first quadrant? Explain. 12)

Find a parametrization for the curve.

13) The line segment with endpoints $(-4, 3)$ and $(-1, -6)$ 13)

Provide an appropriate response.

14) Find the tangent to the curve $y = 4 \cot\left(\frac{\pi x}{2}\right)$ at $x = \frac{1}{2}$. What is the largest value the slope of the curve can ever have on the interval $-2 < x < 0$? 14)

15) If $g(x) = 2f(x) + 3$, find $g'(4)$ given that $f'(4) = 5$. 15)

Find the derivatives of all orders of the function.

16) $y = \frac{4}{3}x^3 + \frac{7}{2}x^2 - 3x - 11$ 16)

Provide an appropriate response.

17) Find the derivative of $y = \frac{x^3 + 3x^2}{x^4}$ by using the Quotient Rule and by simplifying and then using the Power Rule for Negative Integers. Show that your answers are equivalent. 17)

18) Find $d^{998}/dx^{998}(\sin x)$. 18)

19) Given that $(x - 3)^2 + y^2 = 9$, find $\frac{dy}{dx}$ two ways: (1) by solving for y and differentiating the resulting functions with respect to x and (2) by implicit differentiation. Show that the results are the same. 19)

20) Suppose that $u = g(x)$ is differentiable at $x = 1$, $y = f(u)$ is differentiable at $u = g(1)$, and $(f \circ g)'(1)$ is positive. What can be said about the values of $g'(1)$ and $f'(g(1))$? Explain. 20)

21) Rewrite tan x and use the product rule to verify the derivative formula for tan x. 21)

22) Graph $y = -\tan x$ and its derivative together on $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$. Is the slope of the graph of $y = -\tan x$ ever positive? Explain. 22)

23) Over what intervals of x–values, if any, does the function $y = \frac{x^5}{5}$ decrease as x increases? 23)

For what values of x, if any, is y' negative? How are your answers related?

Find a parametrization for the curve.

24) The upper half of the parabola $x + 2 = y^2$ 24)

Provide an appropriate response.

25) Find dy/dt when x = 5 if $y = 2x^2 - 6x + 7$ and dx/dt = 1/2. 25)

26) Suppose that r is a differentiable function of s, s is a differentiable function of t, and t is a differentiable function of u. Write a formula for dr/du. 26)

27) Explain why the curve $x^2 + y^2 = 2x + 2y - 3$ has no horizontal tangents. 27)

28) Find the derivative of $y = 3(x^3 - 4x^2)$ by using the Product Rule and by using the Constant Multiple Rule. Show that your answers are equivalent. 28)

29) Find a value of c that will make 29)

$$f(x) = \begin{cases} \dfrac{\sin^2 4x}{x^2}, & x \neq 0 \\ c, & x = 0 \end{cases}$$

continuous at x = 0.

30) Does the curve $y = \sqrt{x}$ ever have a negative slope? If so, where? Give reasons for your answer. 30)

31) Which of the following could be true if $f''(x) = x^{-1/4}$? 31)

i) $f'''(x) = \frac{1}{4}x^{-3/4}$

ii) $f'(x) = \frac{4}{3}x^{3/4} + 3$

iii) $f(x) = \frac{16}{21}x^{7/4} + 5$

iv) $f(x) = \frac{4}{3}x^{3/4} - 1$

Solve the problem.

32) For functions of the form $y = ax^n$, show that the relative uncertainty $\left|\frac{dy}{y}\right|$ in the dependent variable y is always $|n|$ times the relative uncertainty $\left|\frac{dx}{x}\right|$ in the independent variable x. 32)

Provide an appropriate response.

33) What is wrong with the following application of the chain rule? What is the correct derivative? 33)

$$\frac{d}{dx}(x^2 - 3x)^4 = 4x^3(2x - 3)$$

34) Over what intervals of x–values, if any, does the function $y = 2x^2$ increase as x increases? For what values of x, if any, is y' positive? How are your answers related? 34)

35) Find $\frac{d}{dx}\left(\frac{x^3 - 2}{x}\right)$ by using the Quotient Rule and by using the Product Rule. Show that your answers are equivalent. 35)

36) Find the derivative of $y = \frac{5}{x^3}$ by using the Quotient Rule and by using the Power Rule for Negative Integers. Show that your answers are equivalent. 36)

37) Which of the following could be true if $f'(x) = -x^{-1/2}$? 37)

i) $f'''(x) = -\frac{3}{4}x^{-5/2}$

ii) $f''(x) = \frac{1}{2}x^{-3/2}$

iii) $f(x) = -x^{1/2}$

iv) $f(x) = -\frac{1}{2}x^{1/2}$

38) What is the range of values of the slope of the curve $y = x^3 + 5x - 2$? 38)

Find a parametrization for the curve.

39) The ray (half line) with initial point (–6, 2) that passes through the point (–15, –2) 39)

Provide an appropriate response.

40) Find d^{997}/dx^{997} (sin x). 40)

41) Is there any difference between finding the derivative of f(x) at x = a and finding the slope of the line tangent to f(x) at x = a? Explain. 41)

42) Suppose that u = g(x) is differentiable at x = 2 and that y = f(u) is differentiable at u = g(2). If the tangent to the graph of y = f(g(x)) at x = 2 is not horizontal, what can we conclude about the tangent to the graph of g at x = 2 and the tangent to the graph of f at u = g(2)? Explain. 42)

43) Graph y = – tan x and its derivative together on $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$. Does the graph of y = –tan x appear to have a smallest slope? If so, what is it? If not, explain. 43)

Solve the problem.

44) Consider the functions $f(x) = x^2$ and $g(x) = x^3$ and their linearizations at the origin. Over some interval $-\varepsilon \le x \le \varepsilon$, the approximation error for g(x) is less than the approximation error for f(x) for all x within the interval. Derive a reasonable approximation for the value of ε. Show your work. (Hint, the absolute value of the second derivative of each function gives a measure of how quickly the slopes of the function and its linear approximation are deviating from one another.) 44)

Provide an appropriate response.

45) Does the curve $y = x^3 + 4x - 10$ have a tangent whose slope is -2? If so, find an equation for the line and the point of tangency. If not, why not? 45)

46) Find equations for the tangents to the curves $y = \tan 2x$ and $y = -\tan(x/2)$ at the origin How are the tangents related? 46)

47) Suppose that the function v in the Quotient Rule has a constant value c. What does the Quotient Rule then say? 47)

48) Assume $y = f(u)$ is a differentiable function of u and $u = g(x)$ is a differentiable function of x. If y changes m times as fast as u and u changes n times as fast as x, then y changes how many times as fast as x? 48)

Find the derivatives of all orders of the function.

49) $y = \dfrac{x^7}{10{,}080}$ 49)

Provide an appropriate response.

50) Show that the derivative of $y = |x|$, $x \neq 0$, is $y' = \dfrac{x}{|x|}$ by writing $y = |x| = \sqrt{x^2}$ and then using the chain rule. 50)

51) Does the curve $y = (x + 3)^3$ have any horizontal tangents? If so, where? Give reasons for your answer. 51)

52) Find $\dfrac{d}{dx}\left(\dfrac{1}{x^2}\right)$ by using the Quotient Rule and by using the Power Rule for Negative Integers. Show that your answers are equivalent. 52)

53) Graph $y = -\tan x$ and its derivative together on $\left[-\dfrac{\pi}{2}, \dfrac{\pi}{2}\right]$. Does the graph of $y = -\tan x$ appear to have a largest slope? If so, what is it? If not, explain. 53)

54) Find the derivative of $y = 5x(x^2 - 3x)$ by using the Product Rule and by rewriting and then using the Constant Multiple Rule. Show that your answers are equivalent. 54)

55) If $g(x) = -f(x) - 3$, find $g'(4)$ given that $f'(4) = 5$. 55)

56) What is wrong with the following? 56)

$y = \dfrac{x^3}{x^5}$

$\dfrac{dy}{dx} = \dfrac{3x^2}{5x^4} = \dfrac{3}{5x^2}$

What is the correct derivative?

57) Given $x^3y + y^2x = 10$, find both dy/dx (treating y as a differentiable function of x) and dx/dy (treating x as a differentiable function of y). How are dy/dx and dx/dy related? 57)

58) Find d^{998}/dx^{998} (cos x). 58)

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

Use implicit differentiation to find dy/dx.

59) $x = \sec(7y)$ 59)

A) $7 \sec(7y) \tan(7y)$
B) $\frac{1}{7} \sec(7y) \tan(7y)$
C) $\cos(7y) \cot(7y)$
D) $\frac{1}{7} \cos(7y) \cot(7y)$

Suppose that the functions f and g and their derivatives with respect to x have the following values at the given values of x. Find the derivative with respect to x of the given combination at the given value of x.

60) 60)

x	f(x)	g(x)	f′(x)	g′(x)
3	1	16	6	5
4	–3	3	5	–5

$1/g^2(x)$, $x = 4$

A) $\frac{2}{125}$
B) $\frac{10}{27}$
C) $-\frac{10}{27}$
D) $-\frac{2}{27}$

Solve the problem.

61) Suppose that the dollar cost of producing x radios is $c(x) = 800 + 40x - 0.2x^2$. Find the marginal cost when 50 radios are produced. 61)

A) \$60
B) \$20
C) –\$2300
D) \$2300

The function f(x) changes value when x changes from x_0 to $x_0 + dx$. Find the approximation error $|\triangle f - df|$. Round your answer, if appropriate.

62) $f(x) = \frac{1}{x^2}$, $x_0 = 3$, $dx = 0.6$ 62)

A) 0.01173
B) 0.13024
C) 0.17654
D) 0.01049

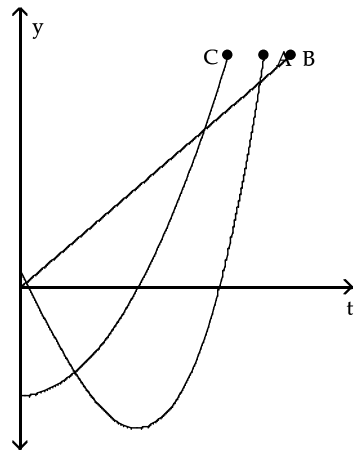
Find the value of d^2y/dx^2 at the point defined by the given value of t.

63) $x = \sqrt{t + 3}$, $y = -t$, $t = 13$ 63)

A) $\frac{1}{4}$
B) –2
C) $-\frac{1}{2}$
D) 8

The graphs show the position s, velocity v = ds/dt, and acceleration a = d^2s/dt^2 of a body moving along a coordinate line as functions of time t. Which graph is which?

64) 64)



A) B = position, C = velocity, A = acceleration
B) A = position, B = velocity, C = acceleration
C) A = position, C = velocity, B = acceleration
D) C = position, A = velocity, B = acceleration

Find the value of d^2y/dx^2 at the point defined by the given value of t.

65) $x = \csc t,\ y = 3 \cot t,\ t = \frac{\pi}{3}$ 65)

A) $-9\sqrt{3}$
B) $-6\sqrt{3}$
C) $3\sqrt{3}$
D) $6\sqrt{3}$

Given y = f(u) and u = g(x), find dy/dx = $f'(g(x))g'(x)$.

66) $y = u^2,\ u = 5x - 3$ 66)

A) $30x - 15$
B) $25x - 15$
C) $50x$
D) $50x - 30$

Find the limit.

67) $\lim\limits_{x \to 7} \cos\left(\frac{1}{x} - \frac{1}{7}\right)$ 67)

A) 1
B) 0
C) -1
D) $\frac{1}{2}$

Find y$'$.

68) $y = \left(\frac{3}{x} + x\right)\left(\frac{3}{x} - x\right)$ 68)

A) $-\frac{18}{x} + 2x$
B) $\frac{18}{x^3} + 2x$
C) $-\frac{9}{x^3} - 2x$
D) $-\frac{18}{x^3} - 2x$

The equation gives the position s = f(t) of a body moving on a coordinate line (s in meters, t in seconds).

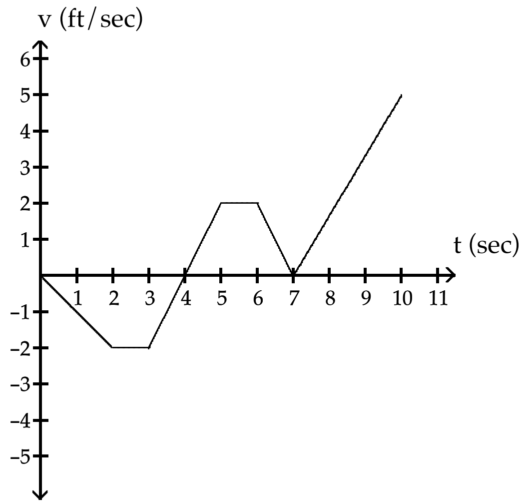
69) $s = 3 + 9 \cos t$ 69)

Find the body's velocity at time $t = \pi/3$ sec.

A) $\frac{9\sqrt{3}}{2}$ m/sec
B) $-\frac{9\sqrt{3}}{2}$ m/sec
C) $\frac{9}{2}$ m/sec
D) $-\frac{9}{2}$ m/sec

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

70) 70)



When does the body reverse direction?

A) $t = 4$, $t = 7$ sec
B) $t = 4$ sec
C) $t = 2$, $t = 3$, $t = 5$, $t = 6$, $t = 7$ sec
D) $t = 7$ sec

Suppose u and v are differentiable functions of x. Use the given values of the functions and their derivatives to find the value of the indicated derivative.

71) $u(1) = 5$, $u'(1) = -5$, $v(1) = 6$, $v'(1) = -4$. 71)

$\frac{d}{dx}(3v - u)$ at $x = 1$

A) -7
B) -17
C) 23
D) 13

Use implicit differentiation to find dy/dx.

72) $x^3 + 3x^2y + y^3 = 8$ 72)

A) $\frac{x^2 + 2xy}{x^2 + y^2}$
B) $-\frac{x^2 + 2xy}{x^2 + y^2}$
C) $\frac{x^2 + 3xy}{x^2 + y^2}$
D) $-\frac{x^2 + 3xy}{x^2 + y^2}$

Find an equation for the line tangent to the curve at the point defined by the given value of t.

73) $x = t + \cos t$, $y = 2 - \sin t$, $t = \frac{\pi}{6}$ 73)

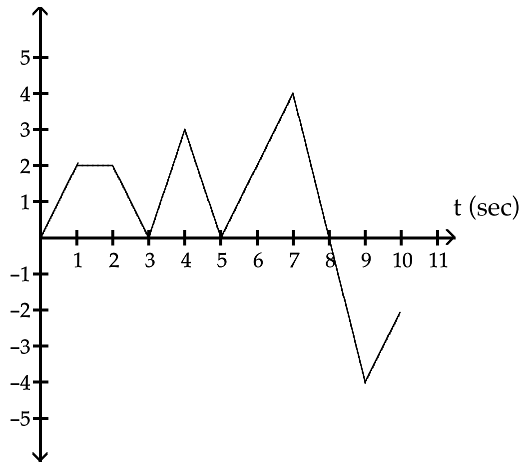
A) $y = -\sqrt{2}x - \frac{\sqrt{2}}{4}\pi + 2$
B) $y = -\sqrt{3}x + \frac{3}{2}$
C) $y = \sqrt{3}x - \frac{\sqrt{3}}{6}\pi$
D) $y = -\sqrt{3}x + \frac{\sqrt{3}}{6}\pi + 3$

Solve the problem. Round your answer, if appropriate.

74) The radius of a right circular cylinder is increasing at the rate of 6 in./sec, while the height is decreasing at the rate of 8 in./sec. At what rate is the volume of the cylinder changing when the radius is 13 in. and the height is 12 in.? 74)

A) -416π in.^{3}/sec
B) 520π in.^{3}/sec
C) -416 in.^{3}/sec
D) -40 in.^{3}/sec

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

75)  75)

When is the body standing still?

A) $2 < t < 3,\ 4 < t < 5,\ 7 < t < 9$

B) $1 < t < 2$

C) $t = 3,\ t = 5,\ t = 8$

D) $8 < t \le 10$

Write the function in the form y = f(u) and u = g(x). Then find dy/dx as a function of x.

76) $y = \left(6x^2 - \frac{3}{x} - x\right)^{10}$ 76)

A) $y = u^{10};\ u = 6x^2 - \frac{3}{x} - x;\ \frac{dy}{dx} = 10\left(6x^2 - \frac{3}{x} - x\right)^9$

B) $y = 6u^2 - \frac{3}{u} - u;\ u = x^{10};\ \frac{dy}{dx} = 12x^{20} - \frac{3}{x^{10}} - x^{10}$

C) $y = u^{10};\ u = 6x^2 - \frac{3}{x} - x;\ \frac{dy}{dx} = 10\left(12x + \frac{3}{x^2} - 1\right)^9$

D) $y = u^{10};\ u = 6x^2 - \frac{3}{x} - x;\ \frac{dy}{dx} = 10\left(6x^2 - \frac{3}{x} - x\right)^9\left(12x + \frac{3}{x^2} - 1\right)$

Find the derivative of the function.

77) $y = \frac{x^3}{x - 1}$ 77)

A) $y' = \frac{-2x^3 - 3x^2}{(x - 1)^2}$

B) $y' = \frac{2x^3 + 3x^2}{(x - 1)^2}$

C) $y' = \frac{-2x^3 + 3x^2}{(x - 1)^2}$

D) $y' = \frac{2x^3 - 3x^2}{(x - 1)^2}$

Solve the problem.

78) Find an equation for the tangent to the curve $y = \frac{27}{x^2 + 2}$ at the point (1, 9). 78)

A) $y = -3x + 12$

B) $y = -6x + 15$

C) $y = 6x + 3$

D) $y = -6$

Suppose that the functions f and g and their derivatives with respect to x have the following values at the given values of x. Find the derivative with respect to x of the given combination at the given value of x.

79)

x	f(x)	g(x)	f ′(x)	g ′(x)
3	1	9	8	7
4	3	3	2	–4

79)

$f^2(x) \cdot g(x)$, $x = 3$

A) 25 B) 79 C) 112 D) 151

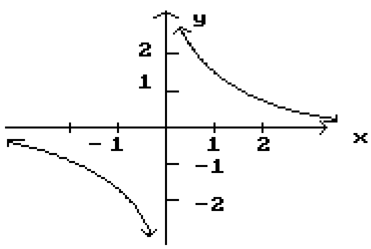
Find the value of d^2y/dx^2 at the point defined by the given value of t.

80) $x = 6t^2 - 3$, $y = t^5$, $t = 1$ 80)

A) $\frac{5}{4}$ B) $-\frac{5}{48}$ C) $\frac{5}{48}$ D) $-\frac{5}{4}$

Given the graph of f, find any values of x at which f ′ is not defined.

81) 81)

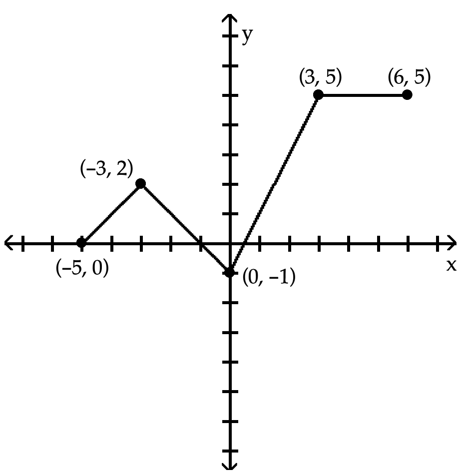


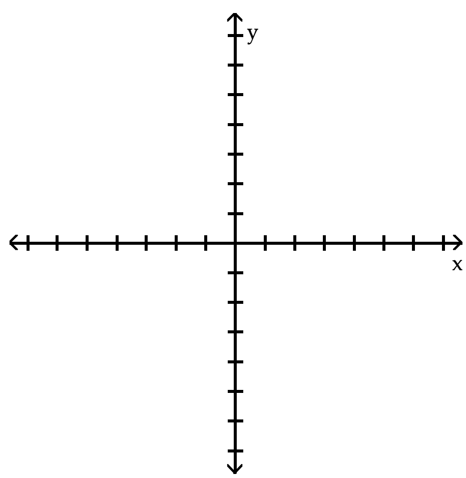
A) x = –1, 1 B) x = –1, 0, 1

C) x = 0 D) Defined for all values of x

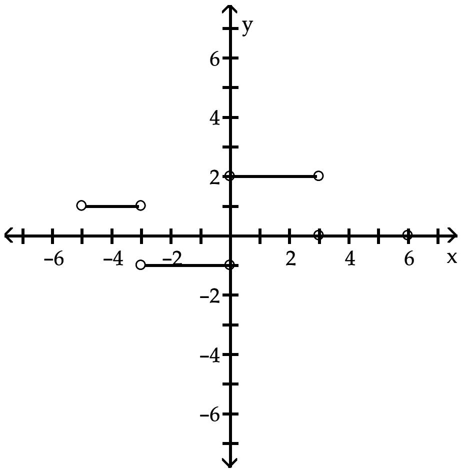
Solve the problem.

82) The graph of y = f(x) in the accompanying figure is made of line segments joined end to end. Graph the derivative of f. 82)

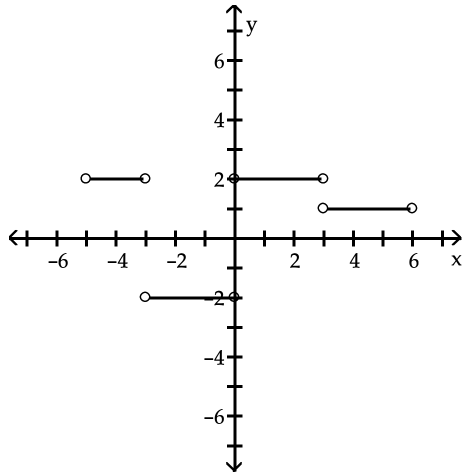




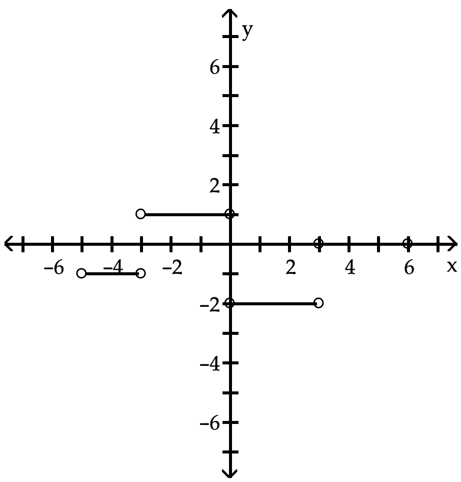
A)



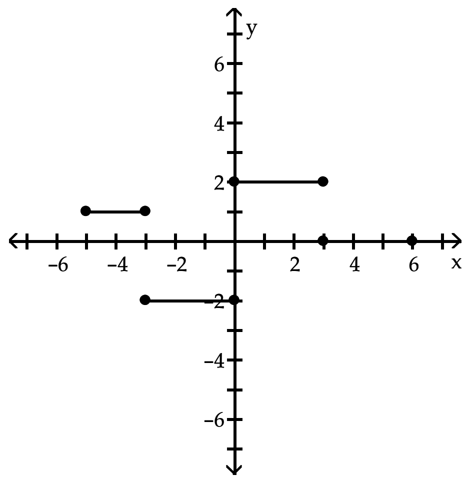
B)



C)



D)



83) A charged particle of mass m and charge q moving in an electric field E has an acceleration a given by 83)

$$a = \frac{qE}{m},$$

where q and E are constants. Find $\frac{d^2a}{dm^2}$.

A) $\frac{d^2a}{dm^2} = \frac{qE}{2m}$ B) $\frac{d^2a}{dm^2} = \frac{2qE}{m^3}$ C) $\frac{d^2a}{dm^2} = \frac{qE}{m^3}$ D) $\frac{d^2a}{dm^2} = -\frac{qE}{m^2}$

84) Estimate the volume of material in a cylindrical shell with height 30 in., radius 7 in., and shell thickness 0.6 in. (Use 3.14 for π.) 84)

A) 791.3 in.^{3} B) 801.3 in.^{3} C) 1318.8 in.^{3} D) 395.6 in.^{3}

The equation gives the position s = f(t) of a body moving on a coordinate line (s in meters, t in seconds).

85) $s = 2 + 11 \cos t$ 85)

Find the body's jerk at time $t = \pi/3$ sec.

A) $-\frac{11\sqrt{3}}{2}$ m/sec^3 B) $-\frac{11}{2}$ m/sec^3 C) $\frac{11}{2}$ m/sec^3 D) $\frac{11\sqrt{3}}{2}$ m/sec^3

Find y''.

86) $y = \left(9 + \frac{3}{x}\right)^4$ 86)

A) $-\frac{36}{x^2}\left(9 + \frac{3}{x}\right)^2 + \frac{24}{x^3}\left(9 + \frac{3}{x}\right)^3$

B) $-\frac{12}{x^2}\left(9 + \frac{3}{x}\right)^3$

C) $\frac{108}{x^4}\left(9 + \frac{3}{x}\right)^2 + \frac{24}{x^3}\left(9 + \frac{3}{x}\right)^3$

D) $12\left(9 + \frac{3}{x}\right)^2$

Find the value of $(f \circ g)'$ at the given value of x.

87) $f(u) = \frac{1}{u}$, $u = g(x) = 6x - x^2$, $x = 1$ 87)

A) $\frac{4}{25}$

B) $-\frac{4}{25}$

C) $\frac{1}{4}$

D) $-\frac{1}{4}$

Use implicit differentiation to find dy/dx.

88) $xy + x + y = x^2y^2$ 88)

A) $\frac{2xy^2 + y + 1}{-2x^2y - x - 1}$

B) $\frac{2xy^2 - y - 1}{-2x^2y + x + 1}$

C) $\frac{2xy^2 + y}{2x^2y - x}$

D) $\frac{2xy^2 - y}{2x^2y + x}$

Given $y = f(u)$ and $u = g(x)$, find $dy/dx = f'(g(x))g'(x)$.

89) $y = \tan u$, $u = -11x + 6$ 89)

A) $\sec^2(-11x + 6)$

B) $-\sec^2(-11x + 6)$

C) $-11 \sec(-11x + 6) \tan(-11x + 6)$

D) $-11 \sec^2(-11x + 6)$

Use implicit differentiation to find dy/dx and d^2y/dx^2.

90) $2y - x + xy = 8$ 90)

A) $\frac{dy}{dx} = \frac{1 - y}{2 + x}; \frac{d^2y}{dx^2} = \frac{2y - 2}{(2 + x)^2}$

B) $\frac{dy}{dx} = -\frac{1 + y}{x + 2}; \frac{d^2y}{dx^2} = \frac{2y - 2}{(x + 2)^2}$

C) $\frac{dy}{dx} = -\frac{1 + y}{x + 2}; \frac{d^2y}{dx^2} = \frac{y + 1}{(2 + x)^2}$

D) $\frac{dy}{dx} = \frac{y + 1}{x + 2}; \frac{d^2y}{dx^2} = \frac{2y + 2}{(x + 2)^2}$

Solve the problem.

91) The line that is normal to the curve $x^2 - xy + y^2 = 9$ at (3, 3) intersects the curve at what other point? 91)

A) (0, –3)

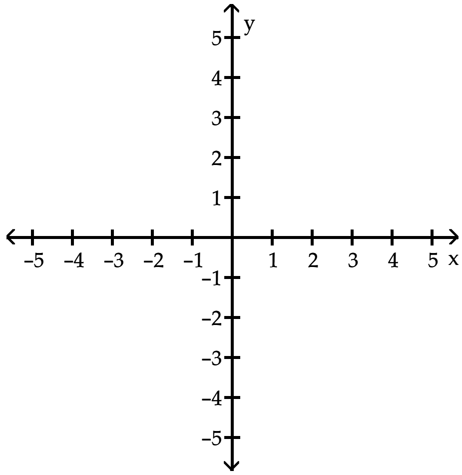
B) (–6, –6)

C) (–3, 0)

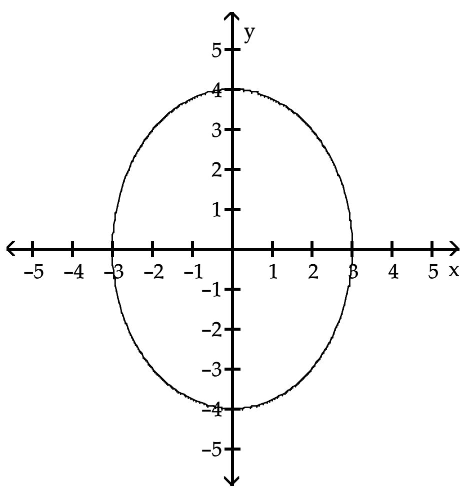
D) (–3, –3)

Parametric equations and and a parameter interval for the motion of a particle in the xy–plane are given. Identify the particle's path by finding a Cartesian equation for it. Graph the Cartesian equation. Indicate the portion of the graph traced by the particle and the direction of motion.

92) $x = 4 \sin t$, $y = 3 \cos t$, $0 \le t \le 2\pi$ 92)

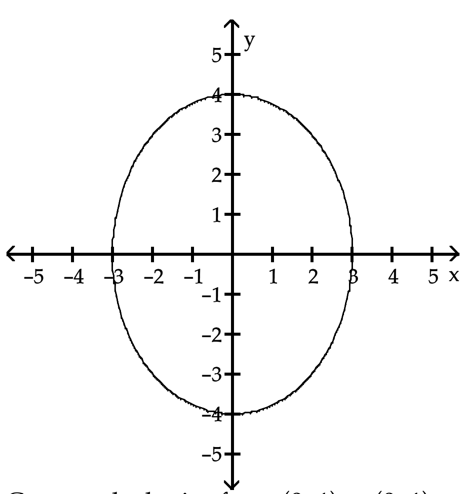


A) $\frac{x^2}{9} + \frac{y^2}{16} = 1$



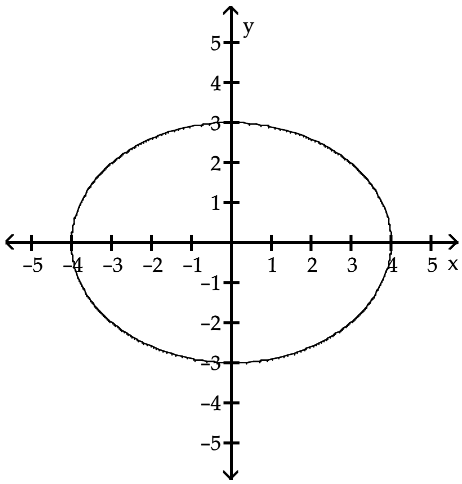
Counterclockwise from (3, 0) to (3, 0), one rotation

B) $\frac{x^2}{9} + \frac{y^2}{16} = 1$



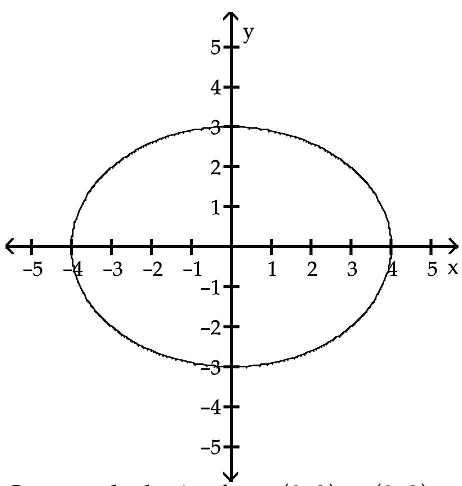
Counterclockwise from (0, 4) to (0, 4), one rotation

C) $\frac{x^2}{16} + \frac{y^2}{9} = 1$



Counterclockwise from (4, 0) to (4, 0), one rotation

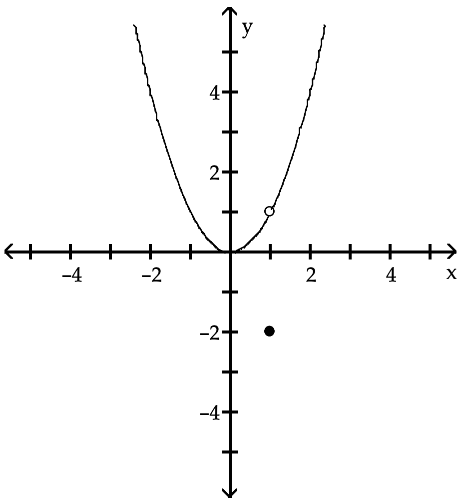
D) $\frac{x^2}{16} + \frac{y^2}{9} = 1$



Counterclockwise from (0, 3) to (0, 3), one rotation

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?

93) $x = 1$ 93)



A) Differentiable

B) Continuous but not differentiable

C) Neither continuous nor differentiable

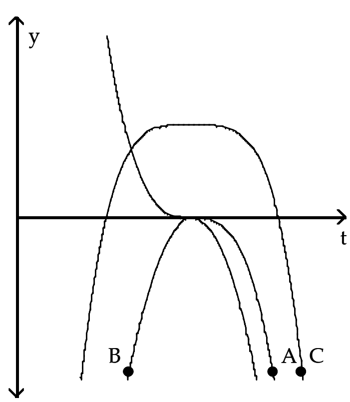
Find the derivative.

94) $r = \frac{3}{s^3} - \frac{9}{s}$ 94)

A) $\frac{3}{s^4} - \frac{9}{s^2}$ B) $-\frac{9}{s^2} + \frac{9}{s^2}$ C) $-\frac{9}{s^4} + \frac{9}{s^2}$ D) $\frac{9}{s^4} - \frac{9}{s^2}$

The graphs show the position s, velocity v = ds/dt, and acceleration a = d^2s/dt^2 of a body moving along a coordinate line as functions of time t. Which graph is which?

95) 95)



A) A = position, B = velocity, C = acceleration B) A = position, C = velocity, B = acceleration

C) B = position, A = velocity, C = acceleration D) C = position, A = velocity, B = acceleration

Find the indicated derivative.

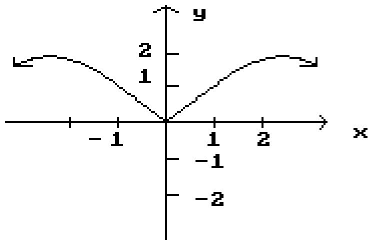
96) Find y'' if $y = 8x \sin x$. 96)

A) $y'' = -16 \cos x + 8x \sin x$ B) $y'' = -8x \sin x$

C) $y'' = 8 \cos x - 16x \sin x$ D) $y'' = 16 \cos x - 8x \sin x$

Given the graph of f, find any values of x at which f' is not defined.

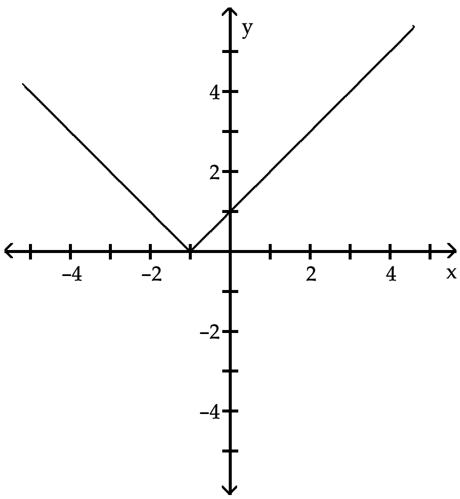
97) 97)



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

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?

98) $x = -1$ 98)



A) Differentiable

B) Continuous but not differentiable

C) Neither continuous nor differentiable

Use implicit differentiation to find dy/dx.

99) $xy + x = 2$ 99)

A) $-\frac{1+y}{x}$ B) $-\frac{1+x}{y}$ C) $\frac{1+y}{x}$ D) $\frac{1+x}{y}$

Find an equation for the line tangent to the curve at the point defined by the given value of t.

100) $x = \sin t,\ y = 3 \sin t,\ t = \frac{\pi}{3}$ 100)

A) $y = 3x - 3\sqrt{3}$ B) $y = 3x + \frac{\sqrt{3}}{2}$ C) $y = -3x + 3\sqrt{3}$ D) $y = 3x$

Find the linearization L(x) of f(x) at x = a.

101) $f(x) = \sin x,\ a = 0$ 101)

A) $L(x) = x$ B) $L(x) = -x$ C) $L(x) = 0$ D) $L(x) = 3x + 1$

Find the derivative of the function.

102) $y = \dfrac{2 - 2x^2 + x^5}{x^9}$ 102)

A) $\dfrac{dy}{dx} = \dfrac{18}{x^{10}} + \dfrac{-14}{x^8} + \dfrac{4}{x^8}$

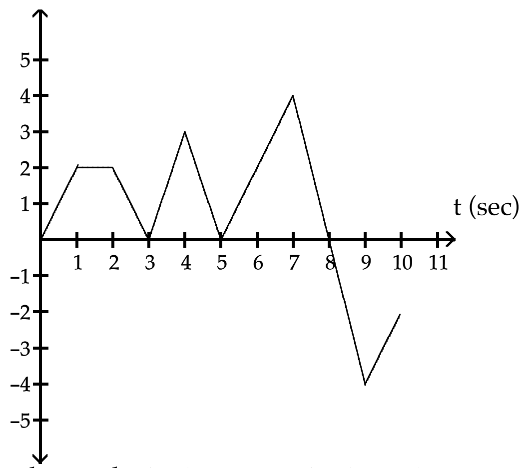
B) $\dfrac{dy}{dx} = -18x^{10} + 14x^8 - 4x^5$

C) $\dfrac{dy}{dx} = \dfrac{-18}{x^8} + \dfrac{14}{x^6} - \dfrac{4}{x^3}$

D) $\dfrac{dy}{dx} = \dfrac{-18}{x^{10}} + \dfrac{14}{x^8} - \dfrac{4}{x^5}$

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

103) 103)



When is the body moving backward?

A) $2 < t < 3$, $4 < t < 5$, $7 < t < 9$

B) $8 < t < 9$

C) $8 < t \le 10$

D) $2 < t < 3$, $4 < t < 5$, $7 < t < 8$

Use implicit differentiation to find dy/dx.

104) $x^5 = \cot y$ 104)

A) $-\dfrac{5x^4}{\csc y \cot y}$

B) $-\dfrac{5x^4}{\csc^2 y}$

C) $\dfrac{\csc^2 y}{5x^4}$

D) $\dfrac{5x^4}{\csc^2 y}$

Find y″.

105) $y = \dfrac{1}{5}\tan(-8x - 5)$ 105)

A) $\dfrac{2}{5}\sec(-8x - 5)$

B) $\dfrac{2}{5}\sec^2(-8x - 5)\tan(-8x - 5)$

C) $-\dfrac{8}{5}\sec^2(-8x - 5)$

D) $\dfrac{128}{5}\sec^2(-8x - 5)\tan(-8x - 5)$

Find the derivative of the function.

106) $y = \sqrt[8]{11x}$ 106)

A) $\dfrac{dy}{dx} = \dfrac{11}{8(11x)^{7/8}}$

B) $\dfrac{dy}{dx} = -\dfrac{11}{8(11x)^{9/8}}$

C) $\dfrac{dy}{dx} = \dfrac{1}{8(11x)^{7/8}}$

D) $\dfrac{dy}{dx} = \dfrac{1}{(11x)^{7/8}}$

Suppose u and v are differentiable functions of x. Use the given values of the functions and their derivatives to find the value of the indicated derivative.

107) $u(1) = 2$, $u'(1) = -6$, $v(1) = 7$, $v'(1) = -4$. 107)

$\frac{d}{dx}(uv)$ at $x = 1$

A) 50 B) −50 C) 34 D) −40

Use implicit differentiation to find dy/dx.

108) $y \cos\left(\frac{1}{y}\right) = 4x + 4y$ 108)

A) $\dfrac{4y^2}{\sin\left(\frac{1}{y}\right) - 4y^2}$

B) $\dfrac{4}{\sin\left(\frac{1}{y}\right) + y \cos\left(\frac{1}{y}\right) - 4}$

C) $\dfrac{4y}{\sin\left(\frac{1}{y}\right) + y \cos\left(\frac{1}{y}\right) - 4y}$

D) $\dfrac{4 - y \sin\left(\frac{1}{y}\right)}{\cos\left(\frac{1}{y}\right) - 4}$

Solve the problem.

109) At the two points where the curve $x^2 + 2xy + y^2 = 25$ crosses the x−axis, the tangents to the curve are parallel. What is the common slope of these tangents? 109)

A) $\frac{3}{5}$ B) 1 C) −1 D) −5

Find the derivative.

110) $s = t^4 \cos t - 11t \sin t - 11 \cos t$ 110)

A) $\frac{ds}{dt} = -t^4 \sin t + 4t^3 \cos t - 11t \cos t - 22 \sin t$

B) $\frac{ds}{dt} = -4t^3 \sin t - 11 \cos t + 11 \sin t$

C) $\frac{ds}{dt} = t^4 \sin t - 4t^3 \cos t + 11t \cos t$

D) $\frac{ds}{dt} = -t^4 \sin t + 4t^3 \cos t - 11t \cos t$

Find the derivative of the function.

111) $r = (\sec \theta + \tan \theta)^{-6}$ 111)

A) $\frac{dr}{d\theta} = \frac{-6 \sec \theta}{(\sec \theta + \tan \theta)^6}$

B) $\frac{dr}{d\theta} = -6(\sec \theta + \tan \theta)^{-7}(\tan^2 \theta + \sec \theta \tan \theta)$

C) $\frac{dr}{d\theta} = -6(\sec \theta \tan \theta + \sec^2 \theta)^{-7}$

D) $\frac{dr}{d\theta} = -6(\sec \theta + \tan \theta)^{-7}$

Assuming that the equations define x and y implicitly as differentiable functions x = f(t), y = g(t), find the slope of the curve x = f(t), y = g(t) at the given value of t.

112) $x(t + 1) - 4t\sqrt{x} = 36$, $2y + 4y^{3/2} = t^3 + t$, $t = 0$ 112)

A) -24 B) -12 C) $-\frac{1}{12}$ D) $-\frac{1}{24}$

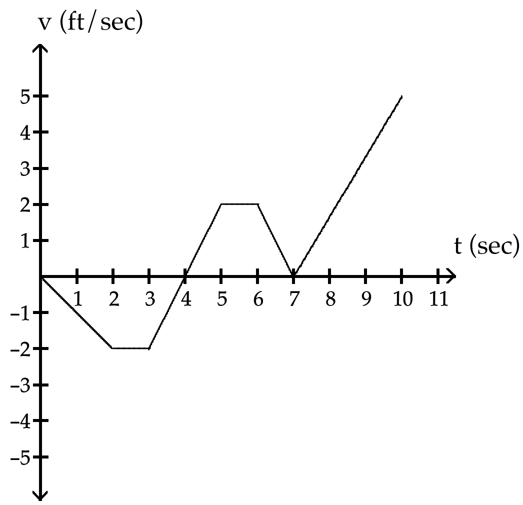
Solve the problem.

113) $A = \pi r^2$, where r is the radius, in centimeters. By approximately how much does the area of a circle decrease when the radius is decreased from 5.0 cm to 4.8 cm? (Use 3.14 for π.) 113)

A) 6.1 cm^2 B) 3.1 cm^2 C) 6.5 cm^2 D) 6.3 cm^2

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

114) 114)



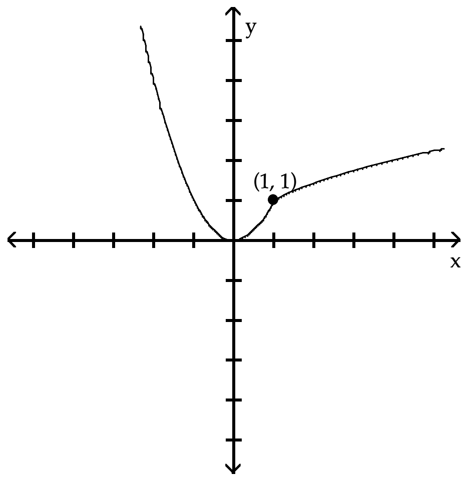
When is the body's acceleration equal to zero?

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

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

Compare the right–hand and left–hand derivatives to determine whether or not the function is differentiable at the point whose coordinates are given.

115) 115)



$y = x^2$ $y = \sqrt{x}$

A) Since $\lim_{x \to 1^+} f'(x) = \frac{1}{2}$ while $\lim_{x \to 1^-} f'(x) = 1$, f(x) is not differentiable at x = 1.

B) Since $\lim_{x \to 1^+} f'(x) = 2$ while $\lim_{x \to 1^-} f'(x) = \frac{1}{2}$, f(x) is not differentiable at x = 1.

C) Since $\lim_{x \to 1^+} f'(x) = \frac{1}{2}$ while $\lim_{x \to 1^-} f'(x) = 2$, f(x) is not differentiable at x = 1.

D) Since $\lim_{x \to 1^+} f'(x) = 2$ while $\lim_{x \to 1^-} f'(x) = 2$, f(x) is differentiable at x = 1.

Find dy.

116) $y = \dfrac{x}{\sqrt{9x + 7}}$ 116)

A) $\dfrac{9x + 14}{2\sqrt{9x + 7}}\,dx$ B) $\dfrac{9x - 14}{2(9x + 7)^{3/2}}\,dx$ C) $\dfrac{9x + 14}{2(9x + 7)^{3/2}}\,dx$ D) $\dfrac{9x - 14}{2\sqrt{9x + 7}}\,dx$

Calculate the derivative of the function. Then find the value of the derivative as specified.

117) $f(x) = \dfrac{8}{x + 2}$; $f'(0)$ 117)

A) $f'(x) = 8$; $f'(0) = 8$ B) $f'(x) = -8(x + 2)^2$; $f'(0) = -32$

C) $f'(x) = -\dfrac{8}{(x + 2)^2}$; $f'(0) = -2$ D) $f'(x) = \dfrac{8}{(x + 2)^2}$; $f'(0) = 2$

Solve the problem.

118) If a and b are the lengths of the legs of a right triangle and c is the length of the hypotenuse, $c^2 = a^2 + b^2$. How is dc/dt related to da/dt and db/dt? 118)

A) $\dfrac{dc}{dt} = a^2\dfrac{da}{dt} + b^2\dfrac{db}{dt}$ B) $\dfrac{dc}{dt} = a\dfrac{da}{dt} + b\dfrac{db}{dt}$

C) $\dfrac{dc}{dt} = 2a\dfrac{da}{dt} + 2b\dfrac{db}{dt}$ D) $\dfrac{dc}{dt} = \dfrac{1}{c}\left(a\dfrac{da}{dt} + b\dfrac{db}{dt}\right)$

Solve the problem. Round your answer, if appropriate.

119) The volume of a rectangular box with a square base remains constant at 400 cm^3 as the area of the base increases at a rate of 15 cm^2/sec. Find the rate at which the height of the box is decreasing when each side of the base is 19 cm long. (Do not round your answer.) 119)

A) $\frac{400}{361}$ cm/sec B) $\frac{6000}{6859}$ cm/sec C) $\frac{15}{361}$ cm/sec D) $\frac{6000}{130321}$ cm/sec

Find an equation of the tangent line at the indicated point on the graph of the function.

120) $y = f(x) = x - x^2$, $(x, y) = (-2, -6)$ 120)

A) $y = -3x + 4$ B) $y = 5x + 4$ C) $y = -5x + 4$ D) $y = -3x - 4$

Solve the problem.

121) Find an equation for the tangent to the curve $y = \frac{10x}{x^2 + 1}$ at the point (1, 5). 121)

A) $y = 5x$ B) $y = 0$ C) $y = 5$ D) $y = x + 5$

Find the derivative of the function.

122) $g(x) = x(x^6 + 4)^{1/3}$ 122)

A) $g'(x) = \frac{3x^6 + 4}{(x^6 + 4)^{2/3}}$ B) $g'(x) = \frac{3x^6 + x + 12}{3(x^6 + 4)^{2/3}}$

C) $g'(x) = \frac{3x^6}{(x^6 + 4)^{1/3}}$ D) $g'(x) = \frac{2x^5}{(x^6 + 4)^{2/3}}$

Solve the problem.

123) Find the slope of the curve $xy^3 - x^5y^2 = -4$ at $(-1, 2)$. 123)

A) $-\frac{3}{4}$ B) $\frac{2}{3}$ C) $-\frac{6}{5}$ D) $-\frac{3}{2}$

124) Find the tangent to $y = \cot x$ at $x = \frac{\pi}{4}$. 124)

A) $y = 2x + 1$ B) $y = -2x + \frac{\pi}{2} + 1$ C) $y = -2x + \frac{\pi}{2}$ D) $y = 2x - \frac{\pi}{2} + 1$

125) Find the points on the curve $x^2 + y^2 = 2x + 2y$ where the tangent is parallel to the x–axis. 125)

A) (1, 1), (1, –1) B) (2, 0), (2, 2)

C) $(1, 1 + \sqrt{2}), (1, 1 - \sqrt{2})$ D) $(2, 2 + \sqrt{2}), (2, 2 - \sqrt{2})$

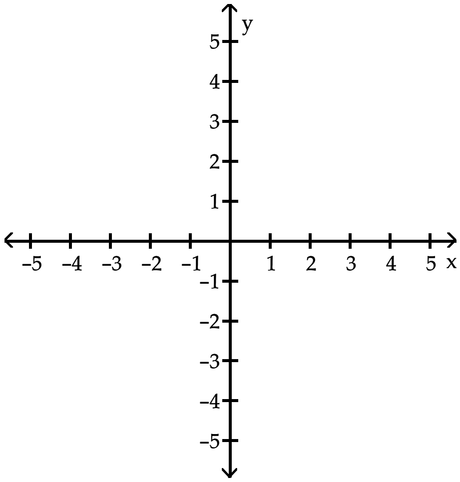
Find an equation of the tangent line at the indicated point on the graph of the function.

126) $y = f(x) = \frac{x^3}{2}$, $(x, y) = (8, 256)$ 126)

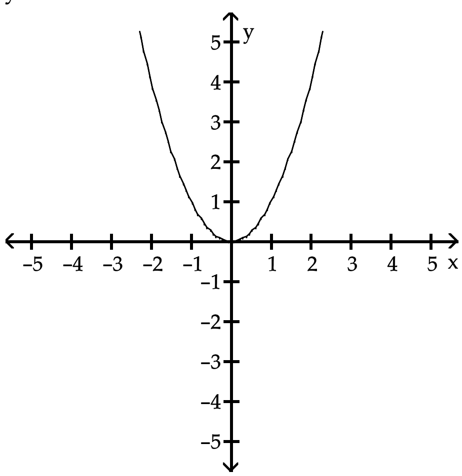
A) $y = 512x + 96$ B) $y = 32x + 512$ C) $y = 32x - 512$ D) $y = 96x - 512$

Parametric equations and and a parameter interval for the motion of a particle in the xy–plane are given. Identify the particle's path by finding a Cartesian equation for it. Graph the Cartesian equation. Indicate the portion of the graph traced by the particle and the direction of motion.

127) $x = 36t^2$, $y = 6t$, $-\infty \le t \le \infty$ 127)

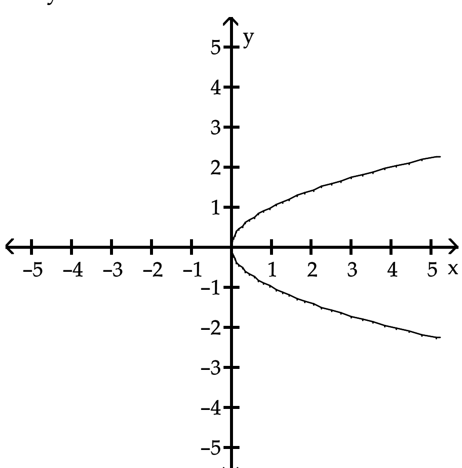


A) $y = x^2$



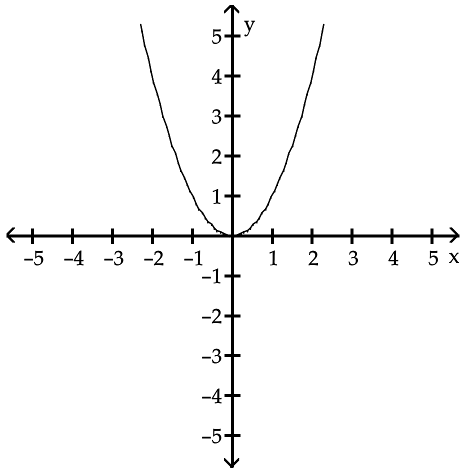
Entire parabola, left to right (from second quadrant to origin to first quadrant)

B) $x = y^2$



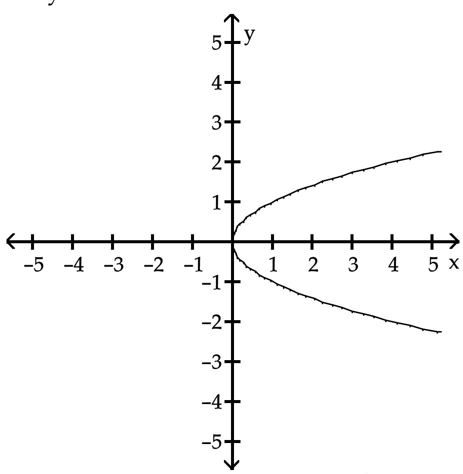
Entire parabola, top to bottom (from first quadrant to origin to fourth quadrant)

C) $y = x^2$



Entire parabola, right to left (from first quadrant to origin to second quadrant)

D) $x = y^2$



Entire parabola, bottom to top (from fourth quadrant to origin to first quadrant)

At the given point, find the slope of the curve, the line that is tangent to the curve, or the line that is normal to the curve, as requested.

128) $y^6 + x^3 = y^2 + 12x$, slope at (0, 1) 128)

A) 2 B) $\frac{3}{2}$ C) 3 D) -3

Solve the problem.

129) The size of a population of lions after t months is $P = 100\,(1 + 0.2t + 0.02t^2)$. Find the growth rate when P = 2500. 129)

A) 180 lions/month B) 160 lions/month

C) 10,020 lions/month D) 140 lions/month

At the given point, find the slope of the curve, the line that is tangent to the curve, or the line that is normal to the curve, as requested.

130) $x^4y^4 = 16$, slope at (2, 1) 130)

A) 2 B) $-\frac{1}{4}$ C) -8 D) $-\frac{1}{2}$

Find the second derivative of the function.

131) $y = \dfrac{(x - 9)(x^2 + 3x)}{x^3}$ 131)

A) $\dfrac{d^2y}{dx^2} = -\dfrac{12}{x^3} - \dfrac{162}{x^4}$

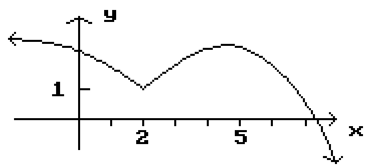
B) $\dfrac{d^2y}{dx^2} = \dfrac{6}{x^2} + \dfrac{54}{x^3}$

C) $\dfrac{d^2y}{dx^2} = -\dfrac{12}{x} - \dfrac{162}{x^2}$

D) $\dfrac{d^2y}{dx^2} = \dfrac{12}{x^3} + \dfrac{162}{x^4}$

Given the graph of f, find any values of x at which f' is not defined.

132) 132)



A) $x = 5$

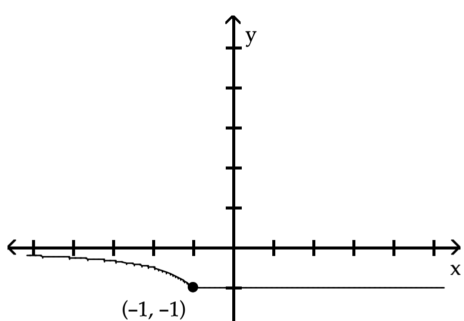
B) $x = 2, 5$

C) $x = 2$

D) Defined for all values of x

Compare the right–hand and left–hand derivatives to determine whether or not the function is differentiable at the point whose coordinates are given.

133) 133)



$y = \dfrac{1}{x}$ $\quad$ $y = -1$

A) Since $\lim_{x\to -1^+} f'(x) = -1$ while $\lim_{x\to -1^-} f'(x) = 0$, f(x) is not differentiable at $x = -1$.

B) Since $\lim_{x\to -1^+} f'(x) = 0$ while $\lim_{x\to -1^-} f'(x) = -1$, f(x) is not differentiable at $x = -1$.

C) Since $\lim_{x\to -1^+} f'(x) = 0$ while $\lim_{x\to -1^-} f'(x) = 1$, f(x) is not differentiable at $x = -1$.

D) Since $\lim_{x\to -1^+} f'(x) = 0$ while $\lim_{x\to -1^-} f'(x) = 0$, f(x) is differentiable at $x = -1$.

Solve the problem.

134) A ball dropped from the top of a building has a height of $s = 400 - 16t^2$ meters after t seconds. How long does it take the ball to reach the ground? What is the ball's velocity at the moment of impact? 134)

A) 25 sec, –800 m/sec
B) 5 sec, 160 m/sec
C) 5 sec, –160 m/sec
D) 10 sec, –80 m/sec

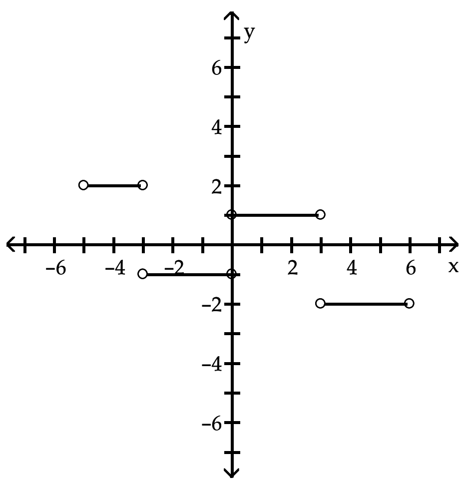
Find the derivative of the function.

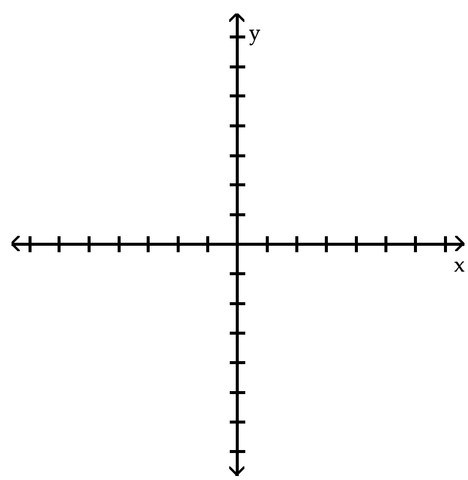
135) $y = \dfrac{(x - 6)(x^2 + 2x)}{x^3}$ 135)

A) $\dfrac{dy}{dx} = \dfrac{4}{x^2} + \dfrac{24}{x^3}$
B) $\dfrac{dy}{dx} = x - \dfrac{24}{x^2} - \dfrac{24}{x^3}$
C) $\dfrac{dy}{dx} = 24 + \dfrac{24}{x}$
D) $\dfrac{dy}{dx} = \dfrac{8}{x^2} - \dfrac{24}{x^3}$

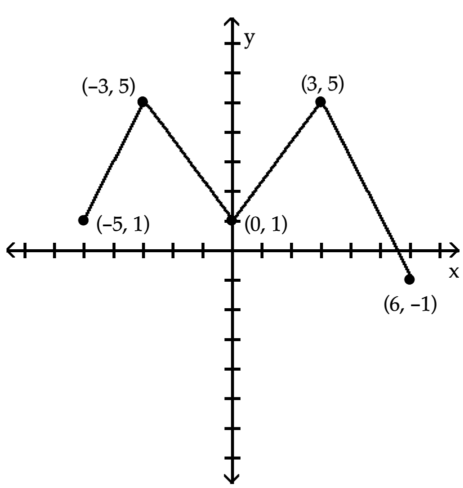
Solve the problem.

136) Use the following information to graph the function f over the closed interval [–5, 6]. 136)
i) The graph of f is made of closed line segments joined end to end.
ii) The graph starts at the point (–5, 1).
iii) The derivative of f is the step function in the figure shown here.

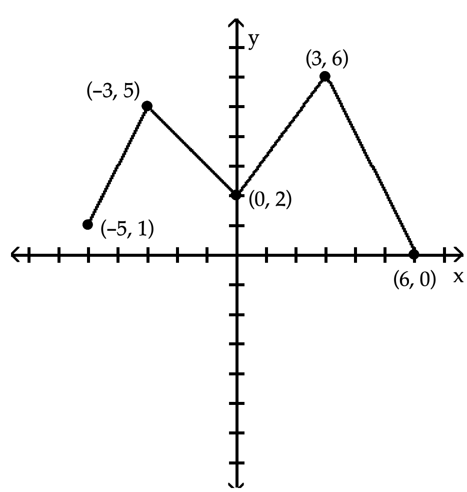




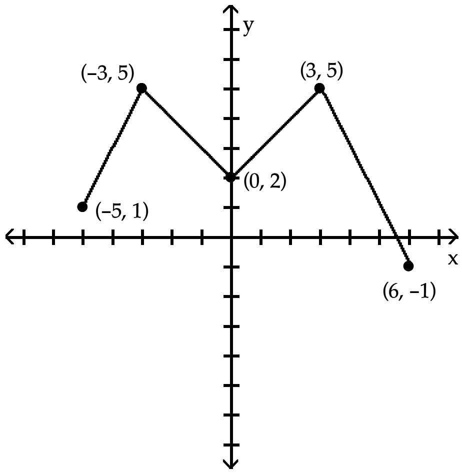
A)



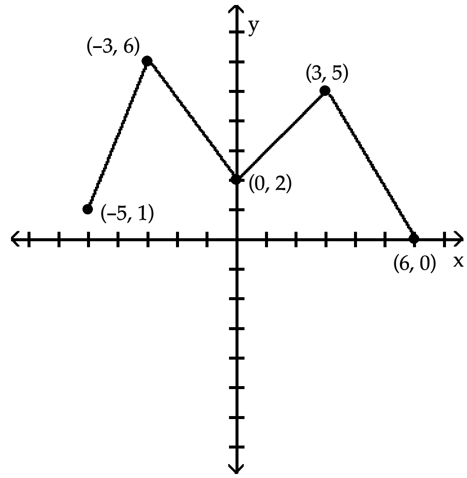
B)



C)



D)



Find the derivative.

137) $y = 12x^{-2} - 2x^3 + 7x$ 137)

A) $-24x^{-1} - 6x^2$ B) $-24x^{-3} - 6x^2 + 7$ C) $-24x^{-1} - 6x^2 + 7$ D) $-24x^{-3} - 6x^2$

Find dy.

138) $y = \cos(7\sqrt{x})$ 138)

A) $\left(\dfrac{7\sin(7\sqrt{x})}{2\sqrt{x}}\right)dx$ B) $\left(\dfrac{-7\sqrt{x}\sin(7\sqrt{x})}{2}\right)dx$

C) $\left(\dfrac{-7\sin(7\sqrt{x})}{2\sqrt{x}}\right)dx$ D) $\left(\dfrac{7\sqrt{x}\sin(7\sqrt{x})}{2}\right)dx$

Find the second derivative.

139) $y = 7x^4 - 7x^2 + 5$ 139)

A) $28x^2 - 14x$ B) $84x^2 - 14x$ C) $28x^2 - 14$ D) $84x^2 - 14$

Solve the problem. Round your answer, if appropriate.

140) Water is discharged from a pipeline at a velocity v (in ft/sec) given by $v = 1240p^{(1/2)}$, where p is the pressure (in psi). If the water pressure is changing at a rate of0.406 psi/sec, find the acceleration (dv/dt) of the water when p = 33.0 psi. 140)

A) 108 ft/sec^2 B) 1450 ft/sec^2 C) 35.6 ft/sec^2 D) 43.8 ft/sec^2

Find the second derivative of the function.

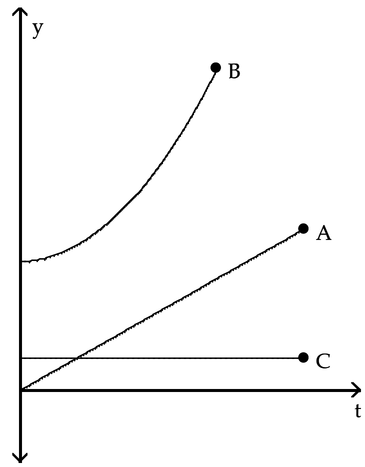
141) $y = \dfrac{4 - 2x^4 + x^6}{x^9}$ 141)

A) $\dfrac{d^2y}{dx^2} = -\dfrac{36}{x^{10}} + \dfrac{10}{x^6} - \dfrac{3}{x^4}$ B) $\dfrac{d^2y}{dx^2} = \dfrac{360}{x^{11}} - \dfrac{60}{x^7} + \dfrac{12}{x^5}$

C) $\dfrac{d^2y}{dx^2} = \dfrac{36}{x^{11}} + \dfrac{10}{x^5} - \dfrac{3}{x^3}$ D) $\dfrac{d^2y}{dx^2} = \dfrac{360}{x^{12}} + \dfrac{60}{x^4} - \dfrac{12}{x^2}$

The graphs show the position s, velocity v = ds/dt, and acceleration a = d^2s/dt^2 of a body moving along a coordinate line as functions of time t. Which graph is which?

142) 142)



A) B = position, A = velocity, C = acceleration
B) A = position, B = velocity, C = acceleration
C) C = position, A = velocity, B = acceleration
D) A = position, C = velocity, B = acceleration

Find the derivative of the function.

143) $y = 8\sqrt{x + 11}$ 143)

A) $\frac{dy}{dx} = -\frac{4}{\sqrt{x + 11}}$
B) $\frac{dy}{dx} = -\frac{4}{(x + 11)^{3/2}}$
C) $\frac{dy}{dx} = \frac{1}{2\sqrt{x + 11}}$
D) $\frac{dy}{dx} = \frac{4}{\sqrt{x + 11}}$

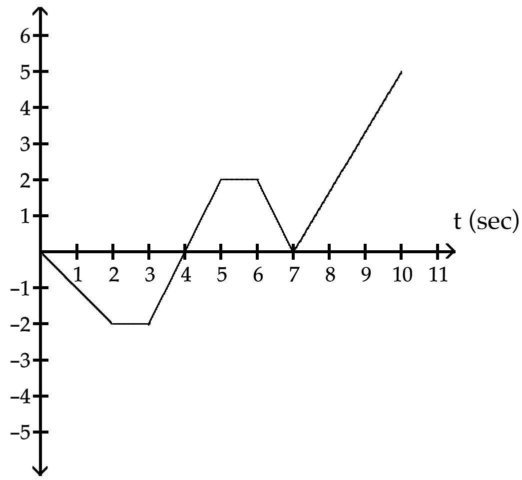
Find y′.

144) $y = (2x^3 + 6)(2x^7 - 3)$ 144)

A) $8x^9 + 84x^6 - 18x^2$
B) $40x^9 + 84x^6 - 18x^2$
C) $40x^9 + 84x^6 - 18x$
D) $8x^9 + 84x^6 - 18x$

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

145) 145)



What is the body's acceleration when $t = 8$ sec?

A) -2 ft/sec^2 B) 1 ft/sec^2 C) 1.67 ft/sec^2 D) 0 ft/sec^2

Assuming that the equations define x and y implicitly as differentiable functions x = f(t), y = g(t), find the slope of the curve x = f(t), y = g(t) at the given value of t.

146) $2x + 4x^{3/2} = t^3 + t,\ y(t + 1) - 4t\sqrt{y} = 25,\ t = 0$ 146)

A) -5 B) 10 C) $-\frac{5}{2}$ D) -10

Find the linearization L(x) of f(x) at x = a.

147) $f(x) = 5x^2 - 4x + 1,\ a = 3$ 147)

A) $L(x) = 34x - 44$ B) $L(x) = 26x + 46$ C) $L(x) = 34x + 46$ D) $L(x) = 26x - 44$

Calculate the derivative of the function. Then find the value of the derivative as specified.

148) $f(x) = 5x + 9;\ f'(2)$ 148)

A) $f'(x) = 0;\ f'(2) = 0$ B) $f'(x) = 9;\ f'(2) = 9$

C) $f'(x) = 5x;\ f'(2) = 10$ D) $f'(x) = 5;\ f'(2) = 5$

Solve the problem.

149) The elasticity ε of a particular thermoplastic can be modeled approximately by the relation $\varepsilon = \frac{2.5x10^5}{T^{2.3}}$, where T is the Kelvin temperature. If the thermometer used to measure T is accurate to 1%, and if the measured temperature is 480 K, how should the elasticity be reported? 149)

A) $\varepsilon = 0.170 \pm 0.004$ B) $\varepsilon = 0.170$ C) $\varepsilon = 0.170 \pm 0.002$ D) $\varepsilon = \pm 0.004$

150) The range R of a projectile is related to the initial velocity v and projection angle θ by the equation $R = \frac{v^2 \sin 2\theta}{g}$, where g is a constant. How is dR/dt related to $d\theta/dt$ if v is constant? 150)

A) $\frac{dR}{dt} = -\frac{v^2 \cos 2\theta}{g}\frac{d\theta}{dt}$ B) $\frac{dR}{dt} = \frac{2v^2 \sin 2\theta}{g}\frac{d\theta}{dt}$

C) $\frac{dR}{dt} = \frac{v^2 \cos 2\theta}{g}\frac{d\theta}{dt}$ D) $\frac{dR}{dt} = \frac{2v^2 \cos 2\theta}{g}\frac{d\theta}{dt}$

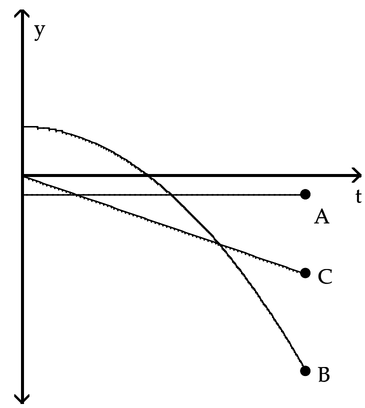
Find the linearization L(x) of f(x) at x = a.

151) $f(x) = x + \frac{1}{x}$, $a = 4$ 151)

A) $L(x) = \frac{15}{16}x + \frac{1}{2}$ B) $L(x) = \frac{17}{16}x + \frac{1}{2}$ C) $L(x) = \frac{15}{16}x + \frac{2}{5}$ D) $L(x) = \frac{17}{16}x + \frac{2}{5}$

The graphs show the position s, velocity v = ds/dt, and acceleration a = d^2s/dt^2 of a body moving along a coordinate line as functions of time t. Which graph is which?

152) 152)



A) C = position, B = velocity, A = acceleration B) B = position, C = velocity, A = acceleration

C) A = position, C = velocity, B = acceleration D) B = position, A = velocity, C = acceleration

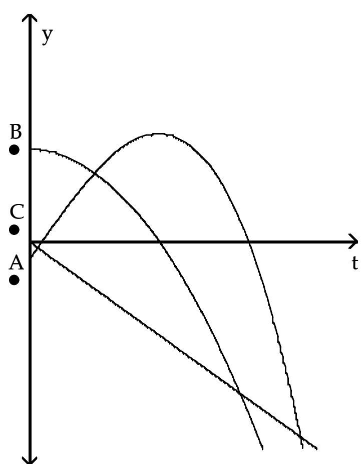
Find the derivative of the function.

153) $y = x^{12/5}$ 153)

A) $\frac{dy}{dx} = \frac{12}{5}x^{11/5}$ B) $\frac{dy}{dx} = x^{7/5}$ C) $\frac{dy}{dx} = \frac{12}{5}x^{7/5}$ D) $\frac{dy}{dx} = \frac{12}{5}x^{-7/5}$

The graphs show the position s, velocity v = ds/dt, and acceleration a = d^2s/dt^2 of a body moving along a coordinate line as functions of time t. Which graph is which?

154) 154)



A) C = position, A = velocity, B = acceleration B) A = position, B = velocity, C = acceleration

C) A = position, C = velocity, B = acceleration D) B = position, A = velocity, C = acceleration

Use implicit differentiation to find dy/dx and d^2y/dx^2.

155) $x^2 + y^2 = 9$ 155)

A) $\frac{dy}{dx} = -\frac{x}{y}; \frac{d^2y}{dx^2} = -\frac{x + y^2}{y^3}$

B) $\frac{dy}{dx} = -\frac{x}{y}; \frac{d^2y}{dx^2} = -\frac{x^2 + y^2}{y^2}$

C) $\frac{dy}{dx} = -\frac{x}{y}; \frac{d^2y}{dx^2} = -\frac{x^2 + y^2}{y^3}$

D) $\frac{dy}{dx} = \frac{x}{y}; \frac{d^2y}{dx^2} = \frac{x^2 - y}{y^2}$

Solve the problem.

156) The range R of a projectile is related to the initial velocity v and projection angle θ by the equation $R = \frac{v^2 \sin 2\theta}{g}$, where g is a constant. How is dR/dt related to dv/dt and $d\theta/dt$ if neither v nor θ is constant? 156)

A) $\frac{dR}{dt} = \frac{v}{g}\left(v \cos 2\theta\frac{d\theta}{dt} + 2 \sin 2\theta\frac{dv}{dt}\right)$

B) $\frac{dR}{dt} = \frac{1}{g}\left(4v \cos 2\theta\frac{d\theta}{dt}\frac{dv}{dt}\right)$

C) $\frac{dR}{dt} = \frac{1}{g}\left(v \cos 2\theta\frac{dv}{dt} + \sin 2\theta\frac{d\theta}{dt}\right)$

D) $\frac{dR}{dt} = \frac{2v}{g}\left(v \cos 2\theta\frac{d\theta}{dt} + \sin 2\theta\frac{dv}{dt}\right)$

The function f(x) changes value when x changes from x_0 to x_0 + dx. Find the approximation error $|\triangle f - df|$. Round your answer, if appropriate.

157) $f(x) = x - x^2$, $x_0 = 5$, $dx = 0.04$ 157)

A) 0.072 B) 0.0016 C) 0.0736 D) 0.144

Find an equation of the tangent line at the indicated point on the graph of the function.

158) $w = g(z) = z^2 - 4$, $(z, w) = (-3, 5)$ 158)

A) $w = -6z - 26$ B) $w = -6z - 22$ C) $w = -6z - 13$ D) $w = -3z - 13$

The equation gives the position s = f(t) of a body moving on a coordinate line (s in meters, t in seconds).

159) $s = 6 \sin t - \cos t$ 159)

Find the body's velocity at time $t = \pi/4$ sec.

A) $-\frac{5\sqrt{2}}{2}$ m/sec B) $\frac{7\sqrt{2}}{2}$ m/sec C) $\frac{5\sqrt{2}}{2}$ m/sec D) $-\frac{7\sqrt{2}}{2}$ m/sec

Find y′.

160) $y = (x^2 - 5x + 2)(3x^3 - x^2 + 5)$ 160)

A) $3x^4 - 60x^3 + 33x^2 + 6x - 25$

B) $15x^4 - 64x^3 + 33x^2 + 6x - 25$

C) $3x^4 - 64x^3 + 33x^2 + 6x - 25$

D) $15x^4 - 60x^3 + 33x^2 + 6x - 25$

Calculate the derivative of the function. Then find the value of the derivative as specified.

161) $f(x) = \frac{8}{x}; f'(-1)$ 161)

A) $f'(x) = -8x^2; f'(-1) = -8$

B) $f'(x) = -\frac{8}{x^2}; f'(-1) = -8$

C) $f'(x) = \frac{8}{x^2}; f'(-1) = 8$

D) $f'(x) = 8; f'(-1) = 8$

At the given point, find the slope of the curve, the line that is tangent to the curve, or the line that is normal to the curve, as requested.

162) $y^4 + x^3 = y^2 + 10x$, normal at (0, 1) 162)

A) $y = \frac{3}{5}x + 1$ B) $y = -\frac{1}{5}x + 1$ C) $y = -\frac{3}{5}x$ D) $y = 5x + 1$

The equation gives the position s = f(t) of a body moving on a coordinate line (s in meters, t in seconds).

163) $s = 8 + 5 \cos t$ 163)

Find the body's acceleration at time $t = \pi/3$ sec.

A) $\frac{5}{2}$ m/sec^2 B) $\frac{5\sqrt{3}}{2}$ m/sec^2 C) $-\frac{5\sqrt{3}}{2}$ m/sec^2 D) $-\frac{5}{2}$ m/sec^2

Solve the problem.

164) $V = \frac{4}{3}\pi r^3$, where r is the radius, in centimeters. By approximately how much does the volume of a sphere increase when the radius is increased from 2.0 cm to 2.1 cm? (Use 3.14 for π.) 164)

A) 5.2 cm^3 B) 5.0 cm^3 C) 4.8 cm^3 D) 0.3 cm^3

Find the second derivative.

165) $y = \frac{19x^3}{6} - 8$ 165)

A) $\frac{19}{2}x^2$ B) $19x$ C) $19x - 8$ D) $\frac{19}{6}x$

Solve the problem.

166) The position (in centimeters) of an object oscillating up and down at the end of a spring is given by $s = A \sin\left(\sqrt{\frac{k}{m}}t\right)$ at time t (in seconds). The value of A is the amplitude of the motion, k is a measure of the stiffness of the spring, and m is the mass of the object. Find the object's acceleration at time t. 166)

A) $a = -A \sin\left(\sqrt{\frac{k}{m}}t\right)$ cm/sec^2 B) $a = -A\sqrt{\frac{k}{m}} \sin\left(\sqrt{\frac{k}{m}}t\right)$ cm/sec^2

C) $a = -\frac{Ak}{m} \sin\left(\sqrt{\frac{k}{m}}t\right)$ cm/sec^2 D) $a = \frac{Ak}{m} \cos\left(\sqrt{\frac{k}{m}}t\right)$ cm/sec^2

Find the linearization L(x) of f(x) at x = a.

167) $f(x) = \sqrt{6x + 81}$, $a = 0$ 167)

A) $L(x) = \frac{1}{3}x - 9$ B) $L(x) = \frac{2}{3}x + 9$ C) $L(x) = \frac{2}{3}x - 9$ D) $L(x) = \frac{1}{3}x + 9$

Solve the problem.

168) The curve $y = ax^2 + bx + c$ passes through the point (2, 28) and is tangent to the line $y = 4x$ at the origin. Find a, b, and c. 168)

A) a = 6, b = 0, c = 0 B) a = 0, b = 5, c = 4 C) a = 4, b = 0, c = 5 D) a = 5, b = 4, c = 0

Find the derivative of the function.

169) $y = (1 + \sin 7t)^{-4}$ 169)

A) $y' = -28(1 + \sin 7t)^{-5} \cos 7t$ B) $y' = -4(1 + \sin 7t)^{-5} \cos 7t$

C) $y' = -28(\cos 7t)^{-5}$ D) $y' = -4(1 + \sin 7t)^{-5}$

Find an equation for the line tangent to the curve at the point defined by the given value of t.

170) $x = 9t^2 - 6,\ y = t^2,\ t = 1$ 170)

A) $y = \frac{1}{9}x + \frac{2}{3}$ B) $y = 9x - \frac{2}{3}$ C) $y = \frac{2}{9}x + 1$ D) $y = \frac{1}{9}x - \frac{2}{3}$

Find the derivative of the function.

171) $s = \sqrt[9]{t^{-4}}$ 171)

A) $\frac{ds}{dt} = -\frac{4}{9}t^{-13/9}$ B) $\frac{ds}{dt} = \frac{4}{9}t^{13/9}$ C) $\frac{ds}{dt} = -\frac{4}{9}t^{13/9}$ D) $\frac{ds}{dt} = -\frac{9}{4}t^{-13/9}$

Find the second derivative of the function.

172) $r = \left(\frac{1 + 3\theta}{3\theta}\right)(3 - \theta)$ 172)

A) $\frac{d^2r}{d\theta^2} = -\frac{2}{\theta^3} - 1$ B) $\frac{d^2r}{d\theta^2} = -\frac{1}{\theta^2} - 1$ C) $\frac{d^2r}{d\theta^2} = \frac{1}{\theta} - \theta$ D) $\frac{d^2r}{d\theta^2} = \frac{2}{\theta^3}$

Find the derivative.

173) $s = t^5 - \csc t + 18$ 173)

A) $\frac{ds}{dt} = 5t^4 + \cot^2 t$ B) $\frac{ds}{dt} = 5t^4 + \csc t \cot t$

C) $\frac{ds}{dt} = 5t^4 - \csc t \cot t$ D) $\frac{ds}{dt} = t^4 - \cot^2 t + 18$

174) $w = z^{-5} - \frac{1}{z}$ 174)

A) $-5z^{-6} + \frac{1}{z^2}$ B) $z^{-6} + \frac{1}{z^2}$ C) $-5z^{-6} - \frac{1}{z^2}$ D) $5z^{-6} - \frac{1}{z^2}$

Find y''.

175) $y = (\sqrt{x} - 9)^{-3}$ 175)

A) $6\,(\sqrt{x} - 9)^{-5}$ B) $-\frac{3}{2x}\,(\sqrt{x} - 9)^{-5}\left(\frac{9}{\sqrt{x}} - 3\right)$

C) $\frac{3}{4x}\,(\sqrt{x} - 9)^{-5}\left(-\frac{9}{\sqrt{x}} + 5\right)$ D) $-\frac{3}{2\sqrt{x}}\,(\sqrt{x} - 9)^{-4}$

Given $y = f(u)$ and $u = g(x)$, find $dy/dx = f'(g(x))g'(x)$.

176) $y = \sin u,\ u = \cos x$ 176)

A) $\cos x \sin x$ B) $-\cos x \sin x$ C) $-\cos(\cos x) \sin x$ D) $\sin(\cos x) \sin x$

Solve the problem.

177) The concentration of a certain drug in the bloodstream x hr after being administered is approximately $C(x) = \frac{6x}{13 + x^2}$. Use the differential to approximate the change in concentration as x changes from 1 to 1.12. 177)

A) 0.04 B) 0.47 C) 0.26 D) 0.30

Find the value of $(f \circ g)'$ at the given value of x.

178) $f(u) = \sin^2 \pi u + u$, $u = g(x) = -x$, $x = 6$ 178)

A) 1 B) 0 C) –1 D) –6

Solve the problem.

179) Suppose that the radius r and the circumference $C = 2\pi r$ of a circle are differentiable functions of t. Write an equation that relates dC/dt to dr/dt. 179)

A) $\frac{dC}{dt} = 2\pi r \frac{dr}{dt}$ B) $\frac{dC}{dt} = \frac{dr}{dt}$ C) $\frac{dC}{dt} = 2\pi \frac{dr}{dt}$ D) $\frac{dr}{dt} = 2\pi \frac{dC}{dt}$

The function s = f(t) gives the position of a body moving on a coordinate line, with s in meters and t in seconds.

180) $s = -t^3 + 4t^2 - 4t$, $0 \le t \le 4$ 180)

Find the body's speed and acceleration at the end of the time interval.

A) 4 m/sec, 0 m/sec^2 B) 20 m/sec, –16 m/sec^2

C) –20 m/sec, –16 m/sec^2 D) 20 m/sec, –4 m/sec^2

Solve the problem.

181) Does the graph of the function $y = 6x + 3 \sin x$ have any horizontal tangents in the interval $0 \le x \le 2\pi$? If so, where? 181)

A) Yes, at $x = \frac{\pi}{3}$, $x = \frac{2\pi}{3}$ B) No

C) Yes, at $x = \frac{2\pi}{3}$, $x = \frac{4\pi}{3}$ D) Yes, at $x = \frac{2\pi}{3}$

Find the value of d^2y/dx^2 at the point defined by the given value of t.

182) $x = \tan t$, $y = 3 \sec t$, $t = \frac{3\pi}{4}$ 182)

A) $3\sqrt{2}$ B) $-\frac{3}{2}$ C) $\frac{\sqrt{2}}{4}$ D) $-\frac{3\sqrt{2}}{4}$

The function s = f(t) gives the position of a body moving on a coordinate line, with s in meters and t in seconds.

183) $s = 3t^2 + 4t + 10$, $0 \le t \le 2$ 183)

Find the body's speed and acceleration at the end of the time interval.

A) 16 m/sec, 6 m/sec^2 B) 16 m/sec, 12 m/sec^2

C) 26 m/sec, 6 m/sec^2 D) 10 m/sec, 2 m/sec^2

Find the limit.

184) $\lim\limits_{x \to \pi/3} \sqrt{3^2 + \sin(\pi \sec x)}$ 184)

A) 0 B) $\sqrt{3^2 + 1}$ C) 1 D) 3

Find the value of d^2y/dx^2 at the point defined by the given value of t.

185) $x = t$, $y = \sqrt{2t}$, $t = 7$ 185)

A) $-\frac{1}{\sqrt{14}}$ B) $-\frac{1}{14\sqrt{14}}$ C) $\frac{1}{14}$ D) $-\frac{1}{14}$

Suppose u and v are differentiable functions of x. Use the given values of the functions and their derivatives to find the value of the indicated derivative.

186) $u(2) = 9$, $u'(2) = 3$, $v(2) = -2$, $v'(2) = -5$. 186)

$\frac{d}{dx}(3v - u)$ at $x = 2$

A) -18 B) -15 C) 3 D) -12

Find the derivative of the function.

187) $y = \frac{(x+5)(x+2)}{(x-5)(x-2)}$ 187)

A) $y' = \frac{14x^2 - 140}{(x-5)^2(x-2)^2}$ B) $y' = \frac{14x - 140}{(x-5)^2(x-2)^2}$

C) $y' = \frac{-x^2 + 20}{(x-5)^2(x-2)^2}$ D) $y' = \frac{-14x^2 + 140}{(x-5)^2(x-2)^2}$

Use implicit differentiation to find dy/dx and d^2y/dx^2.

188) $xy + 3 = y$, at the point $(4, -1)$ 188)

A) $\frac{dy}{dx} = \frac{1}{3}; \frac{d^2y}{dx^2} = \frac{2}{9}$ B) $\frac{dy}{dx} = -\frac{1}{3}; \frac{d^2y}{dx^2} = 0$

C) $\frac{dy}{dx} = \frac{1}{3}; \frac{d^2y}{dx^2} = -\frac{2}{9}$ D) $\frac{dy}{dx} = 3; \frac{d^2y}{dx^2} = -24$

Find the derivative of the function.

189) $y = \frac{x^2 + 8x + 3}{\sqrt{x}}$ 189)

A) $y' = \frac{3x^2 + 8x - 3}{2x^{3/2}}$ B) $y' = \frac{3x^2 + 8x - 3}{x}$

C) $y' = \frac{2x + 8}{x}$ D) $y' = \frac{2x + 8}{2x^{3/2}}$

Calculate the derivative of the function. Then find the value of the derivative as specified.

190) $\left.\frac{ds}{dt}\right|_{t=-3}$ if $s = t^2 - t$ 190)

A) $\frac{ds}{dt} = 2 - t; \left.\frac{ds}{dt}\right|_{t=-3} = 5$ B) $\frac{ds}{dt} = t - 1; \left.\frac{ds}{dt}\right|_{t=-3} = -4$

C) $\frac{ds}{dt} = 2t - 1; \left.\frac{ds}{dt}\right|_{t=-3} = -7$ D) $\frac{ds}{dt} = 2t + 1; \left.\frac{ds}{dt}\right|_{t=-3} = -5$

Find the value of $(f \circ g)'$ at the given value of x.

191) $f(u) = \tan\frac{\pi u}{2}$, $u = g(x) = x^2$, $x = 2$ 191)

A) -4π B) -2π C) 2π D) 4

Solve the problem.

192) Does the graph of the function $y = \tan x - x$ have any horizontal tangents in the interval $0 \le x \le 2\pi$? If so, where? 192)

A) Yes, at $x = \pi$

B) No

C) Yes, at $x = 0$, $x = \pi$, $x = 2\pi$

D) Yes, at $x = \frac{\pi}{2}$, $x = \frac{3\pi}{2}$

Find the slope of the tangent line at the given value of the independent variable.

193) $f(x) = 3x + \frac{9}{x}$, $x = 4$ 193)

A) $\frac{39}{4}$

B) $\frac{57}{16}$

C) $\frac{57}{4}$

D) $\frac{39}{16}$

Solve the problem.

194) A heat engine is a device that converts thermal energy into other forms. The thermal efficiency, e, of a heat engine is defined by 194)

$$e = \frac{Q_h - Q_c}{Q_h},$$

where Q_h is the heat absorbed in one cycle and Q_c, the heat released into a reservoir in one cycle, is a constant. Find $\frac{d^2e}{dQ_h^2}$.

A) $\frac{d^2e}{dQ_h^2} = \frac{Q_c}{Q_h^3}$

B) $\frac{d^2e}{dQ_h^2} = \frac{Q_c}{Q_h^2}$

C) $\frac{d^2e}{dQ_h^2} = \frac{-Q_c}{2Q_h^2}$

D) $\frac{d^2e}{dQ_h^2} = \frac{-2Q_c}{Q_h^3}$

Solve the problem. Round your answer, if appropriate.

195) As the zoom lens in a camera moves in and out, the size of the rectangular image changes. Assume that the current image is 6 cm × 5 cm. Find the rate at which the area of the image is changing (dA/df) if the length of the image is changing at 0.5 cm/s and the width of the image is changing at 0.1 cm/s. 195)

A) 6.2 cm^2/sec

B) 3.1 cm^2/sec

C) 3.5 cm^2/sec

D) 7.0 cm^2/sec

Calculate the derivative of the function. Then find the value of the derivative as specified.

196) $g(x) = -\frac{2}{x}$; $g'(-2)$ 196)

A) $g'(x) = -\frac{2}{x^2}$; $g'(-2) = -\frac{1}{2}$

B) $g'(x) = \frac{2}{x^2}$; $g'(-2) = \frac{1}{2}$

C) $g'(x) = -2x^2$; $g'(-2) = -8$

D) $g'(x) = -2$; $g'(-2) = -2$

Solve the problem.

197) The area $A = \pi r^2$ of a circular oil spill changes with the radius. At what rate does the area change with respect to the radius when $r = 3$ ft? 197)

A) 6π ft^2/ft

B) 3π ft^2/ft

C) 6 ft^2/ft

D) 9π ft^2/ft

198) The position of a particle moving along a coordinate line is $s = \sqrt{2 + 2t}$, with s in meters and t in seconds. Find the particle's velocity at t = 1 sec. 198)

A) $\frac{1}{2}$ m/sec B) $\frac{1}{4}$ m/sec C) $-\frac{1}{2}$ m/sec D) 1 m/sec

Find y′.

199) $y = \left(\frac{1}{x^2} + 3\right)\left(x^2 - \frac{1}{x^2} + 3\right)$ 199)

A) $-\frac{1}{x^5} + 6x$ B) $\frac{4}{x^5} + 6x$ C) $-\frac{4}{x^5} - 6x$ D) $\frac{4}{x^3} + 6x$

Solve the problem.

200) The size of a population of mice after t months is $P = 100(1 + 0.2t + 0.02t^2)$. Find the growth rate at t = 14 months. 200)

A) 152 mice/month B) 176 mice/month C) 38 mice/month D) 76 mice/month

Calculate the derivative of the function. Then find the value of the derivative as specified.

201) $\left.\frac{dr}{d\theta}\right|_{\theta=2}$ if $r = \frac{2}{\sqrt{6 - \theta}}$ 201)

A) $\frac{dr}{d\theta} = \frac{2}{(6 - \theta)^{3/2}}; \left.\frac{dr}{d\theta}\right|_{\theta=2} = \frac{1}{4}$

B) $\frac{dr}{d\theta} = \frac{1}{(6 - \theta)^{3/2}}; \left.\frac{dr}{d\theta}\right|_{\theta=2} = \frac{1}{8}$

C) $\frac{dr}{d\theta} = -\frac{1}{(6 - \theta)^{3/2}}; \left.\frac{dr}{d\theta}\right|_{\theta=2} = -\frac{1}{8}$

D) $\frac{dr}{d\theta} = -\frac{2}{(6 - \theta)^{3/2}}; \left.\frac{dr}{d\theta}\right|_{\theta=2} = -\frac{1}{4}$

The function f(x) changes value when x changes from x_0 to $x_0 + dx$. Find the approximation error $|\triangle f - df|$. Round your answer, if appropriate.

202) $f(x) = x^3$, $x_0 = 2$, $dx = 0.02$ 202)

A) 0.004816 B) 0.003612 C) 0.001204 D) 0.002408

At the given point, find the slope of the curve, the line that is tangent to the curve, or the line that is normal to the curve, as requested.

203) $x^6y^6 = 64$, normal at (2, 1) 203)

A) $y = \frac{1}{32}x$ B) $y = -2x + 5$ C) $y = 2x - 3$ D) $y = -\frac{1}{2}x + 2$

Find dy.

204) $y = \csc(5x^2 - 1)$ 204)

A) $-10x \csc(10x) \cot(10x)\, dx$

B) $10x \csc(5x^2 - 1) \cot(5x^2 - 1) dx$

C) $-10x \csc(5x^2 - 1) \cot(5x^2 - 1)\, dx$

D) $-5x^2 \csc(5x^2 - 1) \cot(5x^2 - 1)\, dx$

Solve the problem.

205) At time t, the position of a body moving along the s-axis is $s = t^3 - 18t^2 + 60t$ m. Find the total distance traveled by the body from t = 0 to t = 3. 205)

A) 101 m B) 49 m C) 105 m D) 45 m

206) The position (in centimeters) of an object oscillating up and down at the end of a spring is given by $s = A \sin\left(\sqrt{\frac{k}{m}}t\right)$ at time t (in seconds). The value of A is the amplitude of the motion, k is a measure of the stiffness of the spring, and m is the mass of the object. How fast is the object accelerating when it is accelerating the fastest? 206)

A) A cm/sec^2 B) $\frac{Ak}{m}$ cm/sec^2 C) A^2 cm/sec^2 D) $A\sqrt{\frac{k}{m}}$ cm/sec^2

Find the derivative.

207) $s = t^3 \tan t - \sqrt{t}$ 207)

A) $\frac{ds}{dt} = 3t^2 \sec^2 t - \frac{1}{2\sqrt{t}}$ B) $\frac{ds}{dt} = t^3 \sec t \tan t + 3t^2 \tan t - \frac{1}{2\sqrt{t}}$

C) $\frac{ds}{dt} = -t^3 \sec^2 t + 3t^2 \tan t + \frac{1}{2\sqrt{t}}$ D) $\frac{ds}{dt} = t^3 \sec^2 t + 3t^2 \tan t - \frac{1}{2\sqrt{t}}$

Use implicit differentiation to find dy/dx and d^2y/dx^2.

208) $x^2 + y^2 = 5$, at the point (2, 1) 208)

A) $\frac{dy}{dx} = -2; \frac{d^2y}{dx^2} = -5$ B) $\frac{dy}{dx} = -2; \frac{d^2y}{dx^2} = 1$

C) $\frac{dy}{dx} = 2; \frac{d^2y}{dx^2} = 5$ D) $\frac{dy}{dx} = -\frac{1}{2}; \frac{d^2y}{dx^2} = 0$

209) $4\sqrt{y} - y = 2x$ 209)

A) $\frac{dy}{dx} = \frac{2\sqrt{y}}{2-\sqrt{y}}; \frac{d^2y}{dx^2} = \frac{4}{(2-\sqrt{y})^3}$ B) $\frac{dy}{dx} = \frac{2}{\sqrt{y}} - 2; \frac{d^2y}{dx^2} = -\frac{2}{y^2}$

C) $\frac{dy}{dx} = \frac{2-\sqrt{y}}{2\sqrt{y}}; \frac{d^2y}{dx^2} = \frac{2-\sqrt{y}}{4y}$ D) $\frac{dy}{dx} = \frac{2\sqrt{y}}{2-\sqrt{y}}; \frac{d^2y}{dx^2} = \frac{2-2\sqrt{y}}{\sqrt{y}(2-\sqrt{y})^2}$

Find the limit.

210) $\lim_{x \to -\pi/2} 5 \cos\left[\sin x + \pi \cot\left(\frac{\pi}{4 \csc x}\right) + 1\right]$ 210)

A) 0 B) 5 C) – 5 D) 1

Solve the problem.

211) A piece of land is shaped like a right triangle. Two people start at the right angle of the triangle at the same time, and walk at the same speed along different legs of the triangle. If the area formed by the positions of the two people and their starting point (the right angle) is changing at 5 m^2/s, then how fast are the people moving when they are 3 m from the right angle? (Round your answer to two decimal places.) 211)

A) 0.83 m/s B) 3.33 m/s C) 1.80 m/s D) 1.67 m/s

Find the derivative of the function.

212) $s = \sin\left(\frac{7\pi t}{2}\right) - \cos\left(\frac{7\pi t}{2}\right)$ 212)

A) $\frac{ds}{dt} = \frac{7\pi}{2}\cos\left(\frac{7\pi t}{2}\right) - \frac{7\pi}{2}\sin\left(\frac{7\pi t}{2}\right)$

B) $\frac{ds}{dt} = \cos\left(\frac{7\pi t}{2}\right) + \sin\left(\frac{7\pi t}{2}\right)$

C) $\frac{ds}{dt} = \frac{7\pi}{2}\cos\left(\frac{7\pi t}{2}\right) + \frac{7\pi}{2}\sin\left(\frac{7\pi t}{2}\right)$

D) $\frac{ds}{dt} = -\frac{7\pi}{2}\cos\left(\frac{7\pi t}{2}\right) - \frac{7\pi}{2}\sin\left(\frac{7\pi t}{2}\right)$

Find the value of $(f \circ g)'$ at the given value of x.

213) $f(u) = \frac{1}{\cos^3 u} - u,\ u = g(x) = \pi x,\ x = 2$ 213)

A) $-\pi$ B) $3 - \pi$ C) 2π D) -2π

Find the derivative of the function.

214) $f(t) = (4 - t)(4 + t^3)^{-1}$ 214)

A) $f'(t) = \frac{2t^3 - 12t^2 - 4}{4 + t^3}$

B) $f'(t) = \frac{-2t^3 + 12t^2 - 4}{(4 + t^3)^2}$

C) $f'(t) = \frac{2t^3 - 12t^2 - 4}{(4 + t^3)^2}$

D) $f'(t) = \frac{-4t^3 + 12t^2 - 4}{(4 + t^3)^2}$

215) $p = \left(\frac{q^6 + 4}{2q}\right)\left(\frac{q^7 + 6}{q}\right)$ 215)

A) $\frac{dp}{dq} = \frac{15}{2}q^{14} + 18q^8 + 24q^7 - \frac{24}{q^3}$

B) $\frac{dp}{dq} = \frac{1}{2}q^{10} + 2q^4 + 3q^3 + \frac{24}{q^3}$

C) $\frac{dp}{dq} = \frac{11}{2}q^{10} + 10q^4 + 12q^3 - \frac{24}{q^3}$

D) $\frac{dp}{dq} = \frac{11}{2}q^{10} - \frac{24}{q^3}$

Find the slope of the tangent line at the given value of the independent variable.

216) $s = 4t^4 + 3t^3,\ t = -1$ 216)

A) -25 B) 7 C) -7 D) 25

Use implicit differentiation to find dy/dx and d^2y/dx^2.

217) $y^2 - x^2 = 3$ 217)

A) $\frac{dy}{dx} = \frac{x}{y};\ \frac{d^2y}{dx^2} = \frac{y^2 - x^2}{y^3}$

B) $\frac{dy}{dx} = -\frac{x}{y};\ \frac{d^2y}{dx^2} = \frac{y^2 - x^2}{y^3}$

C) $\frac{dy}{dx} = \frac{x}{y};\ \frac{d^2y}{dx^2} = \frac{y - x^2}{y^2}$

D) $\frac{dy}{dx} = \frac{x}{y};\ \frac{d^2y}{dx^2} = \frac{y^2 - x^2}{y^2}$

Solve the problem.

218) Suppose that the radius r and volume $V = \frac{4}{3}\pi r^3$ of a sphere are differentiable functions of t. Write an equation that relates dV/dt to dr/dt. 218)

A) $\frac{dV}{dt} = \frac{4}{3}\pi r^2 \frac{dr}{dt}$ B) $\frac{dV}{dt} = 4\pi r^2 \frac{dr}{dt}$ C) $\frac{dV}{dt} = 3r^2 \frac{dr}{dt}$ D) $\frac{dV}{dt} = 4\pi \frac{dr}{dt}$

Find the second derivative of the function.

219) $s = \dfrac{t^7 + 6t + 6}{t^2}$ 219)

A) $\dfrac{d^2s}{dt^2} = 20t^5 + \dfrac{12}{t} + \dfrac{36}{t^2}$

B) $\dfrac{d^2s}{dt^2} = 5t^3 - \dfrac{6}{t^3} - \dfrac{12}{t^4}$

C) $\dfrac{d^2s}{dt^2} = 5t^4 - \dfrac{6}{t^2} - \dfrac{12}{t^3}$

D) $\dfrac{d^2s}{dt^2} = 20t^3 + \dfrac{12}{t^3} + \dfrac{36}{t^4}$

The function s = f(t) gives the position of a body moving on a coordinate line, with s in meters and t in seconds.

220) $s = 2t - t^2,\ 0 \le t \le 2$ 220)

Find the body's speed and acceleration at the end of the time interval.

A) 2 m/sec, -4 m/sec^2

B) -2 m/sec, -2 m/sec^2

C) 6 m/sec, -4 m/sec^2

D) 2 m/sec, -2 m/sec^2

Solve the problem.

221) Suppose that the dollar cost of producing x radios is $c(x) = 800 + 40x - 0.2x^2$. Find the average cost per radio of producing the first 45 radios. 221)

A) \$2195.00

B) \$31.00

C) \$431.00

D) \$1395.00

At the given point, find the slope of the curve, the line that is tangent to the curve, or the line that is normal to the curve, as requested.

222) $5x^2y - \pi \cos y = 6\pi$, normal at $(1, \pi)$ 222)

A) $y = \dfrac{1}{\pi}x - \dfrac{1}{\pi} + \pi$

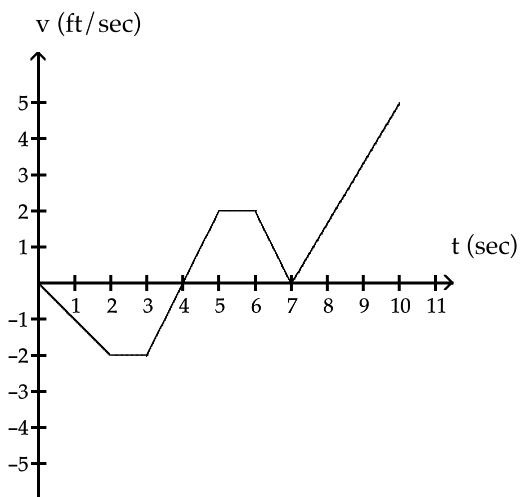
B) $y = -\dfrac{1}{\pi}x + \dfrac{1}{\pi} + \pi$

C) $y = \dfrac{1}{2\pi}x - \dfrac{1}{2\pi} + \pi$

D) $y = -2\pi x + 3\pi$

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

223) 223)



When is the body moving backward?

A) $0 < t < 4$

B) $0 < t < 2,\ 6 < t < 7$

C) $7 < t < 10$

D) $4 < t < 7$

Find y''.

224) $y = \sqrt{3x + 3}$ 224)

A) $-\frac{9\sqrt{3x + 3}}{4}$ B) $-\frac{9}{4(3x + 3)^{3/2}}$ C) $\frac{3}{2\sqrt{3x + 3}}$ D) $-\frac{1}{4(3x + 3)^{3/2}}$

Find the value of $(f \circ g)'$ at the given value of x.

225) $f(u) = u^2$, $u = g(x) = x^5 + 2$, $x = -1$ 225)

A) 15 B) 2 C) 10 D) –30

Solve the problem.

226) A cube 7 inches on an edge is given a protective coating 0.3 inches thick. About how much coating should a production manager order for 500 cubes? 226)

A) About 7350 in.^{2} B) About 51,450 in.^{3}

C) About 22,050 in.^{2} D) About 44,100 in.^{3}

Suppose u and v are differentiable functions of x. Use the given values of the functions and their derivatives to find the value of the indicated derivative.

227) $u(1) = 5$, $u'(1) = -5$, $v(1) = 7$, $v'(1) = -3$. 227)

$\frac{d}{dx}(2u - 4v)$ at $x = 1$

A) –18 B) 38 C) –22 D) 2

The function f(x) changes value when x changes from x_0 to $x_0 + dx$. Find the approximation error $|\triangle f - df|$. Round your answer, if appropriate.

228) $f(x) = x^2$, $x_0 = 9$, $dx = 0.05$ 228)

A) 0.00125 B) 0.005 C) 0.8525 D) 0.0025

At the given point, find the slope of the curve, the line that is tangent to the curve, or the line that is normal to the curve, as requested.

229) $x^3y^3 = 8$, tangent at (2, 1) 229)

A) $y = \frac{1}{2}x$ B) $y = 4x - 1$ C) $y = -\frac{1}{2}x + 2$ D) $y = 4x + 1$

Solve the problem. Round your answer, if appropriate.

230) Boyle's law states that if the temperature of a gas remains constant, then PV = c, where P = pressure, V = volume, and c is a constant. Given a quantity of gas at constant temperature, if V is decreasing at a rate of 9 in.^{3}/sec, at what rate is P increasing when P = 50 lb/in.^{2} and V = 70 in.^{3}? (Do not round your answer.) 230)

A) $\frac{25}{49}$ lb/in.^{2} per sec B) $\frac{3500}{9}$ lb/in.^{2} per sec

C) $\frac{45}{7}$ lb/in.^{2} per sec D) $\frac{63}{5}$ lb/in.^{2} per sec

Solve the problem.

231) Find all points on the curve $y = \sin x$, $0 \le x \le 2\pi$, where the tangent line is parallel to the line $y = \frac{1}{2}x$. 231)

A) $\left(\frac{\pi}{3}, \frac{1}{2}\right), \left(\frac{2\pi}{3}, \frac{1}{2}\right)$

B) $\left(\frac{\pi}{3}, \frac{\sqrt{3}}{2}\right), \left(\frac{5\pi}{3}, -\frac{\sqrt{3}}{2}\right)$

C) $\left(\frac{\pi}{3}, \frac{\sqrt{3}}{2}\right), \left(\frac{2\pi}{3}, \frac{\sqrt{3}}{2}\right)$

D) $\left(\frac{\pi}{6}, \frac{1}{2}\right), \left(\frac{11\pi}{6}, -\frac{1}{2}\right)$

232) About how accurately must the interior diameter of a cylindrical storage tank that is 14 m high be measured in order to calculate the tank's volume within 0.2% of its true value? 232)

A) Within 0.2%

B) Within 0.2 meters

C) Within 0.1 meters

D) Within 0.1%

Suppose that the functions f and g and their derivatives with respect to x have the following values at the given values of x. Find the derivative with respect to x of the given combination at the given value of x.

233) 233)

x	f(x)	g(x)	f′(x)	g′(x)
3	1	16	6	3
4	–3	3	2	–6

$\sqrt{g(x)}$, $x = 3$

A) $-\frac{1}{2\sqrt{3}}$

B) $\frac{1}{8}$

C) $\frac{3}{8}$

D) $\frac{1}{2\sqrt{3}}$

Find the derivative of the function.

234) $f(x) = \cos\left[(10x + 13)^{-1/2}\right]$ 234)

A) $f'(x) = -\sin\left[\frac{-5}{(10x + 13)^{3/2}}\right]$

B) $f'(x) = \frac{5 \sin\left[(10x + 13)^{-1/2}\right]}{(10x + 13)^{3/2}}$

C) $f'(x) = -\sin\left[(10x + 13)^{-1/2}\right]$

D) $f'(x) = \frac{-\sin\left[(10x + 13)^{-1/2}\right]}{2(10x + 13)^{3/2}}$

235) $q = \cos\left(\sqrt{6t + 11}\right)$ 235)

A) $\frac{dq}{dt} = -\sin\left(\sqrt{6t + 11}\right)$

B) $\frac{dq}{dt} = -\sin\left(\frac{3}{\sqrt{6t + 11}}\right)$

C) $\frac{dq}{dt} = -\frac{1}{2\sqrt{6t + 11}} \sin\left(\sqrt{6t + 11}\right)$

D) $\frac{dq}{dt} = -\frac{3}{\sqrt{6t + 11}} \sin\left(\sqrt{6t + 11}\right)$

Find y''.

236) $y = 5 \sin(2x + 11)$ 236)

A) $10 \cos(2x + 11)$

B) $-20 \cos(2x + 11)$

C) $-20 \sin(2x + 11)$

D) $-10 \sin(2x + 11)$

Solve the problem.

237) At time $t \ge 0$, the velocity of a body moving along the s–axis is $v = t^2 - 7t + 6$. When is the body moving backward? 237)

A) $1 < t < 6$

B) $0 \le t < 1$

C) $0 \le t < 6$

D) $t > 6$

Find the second derivative of the function.

238) $y = \dfrac{x^4 + 7}{x^2}$ 238)

A) $\dfrac{d^2y}{dx^2} = 2 - \dfrac{42}{x^4}$ B) $\dfrac{d^2y}{dx^2} = 1 + \dfrac{42}{x^4}$ C) $\dfrac{d^2y}{dx^2} = 2 + \dfrac{42}{x^4}$ D) $\dfrac{d^2y}{dx^2} = 2x - \dfrac{14}{x^3}$

Find the linearization L(x) of f(x) at x = a.

239) $f(x) = \dfrac{1}{9x - 9}$, $a = 0$ 239)

A) $L(x) = -\dfrac{1}{9}x - \dfrac{1}{9}$ B) $L(x) = \dfrac{1}{9}x + \dfrac{1}{81}$

C) $L(x) = \dfrac{1}{9}x - \dfrac{1}{9}$ D) $L(x) = -\dfrac{1}{9}x + \dfrac{1}{81}$

Find y'.

240) $y = (5x - 2)(5x^3 - x^2 + 1)$ 240)

A) $25x^3 + 15x^2 - 45x + 5$ B) $100x^3 - 15x^2 + 45x + 5$

C) $100x^3 - 45x^2 + 4x + 5$ D) $75x^3 + 45x^2 - 15x + 5$

Write a differential formula that estimates the given change in volume or surface area.

241) The change in the volume $V = \pi r^2 h$ of a right circular cylinder when the height changes from h_0 to $h_0 + dh$ and the radius does not change 241)

A) $dV = \pi r_0^2\ dr$ B) $dV = \pi r^2\ dh$ C) $dV = \pi r^2 h_0\ dh$ D) $dV = 2\pi r h_0\ dh$

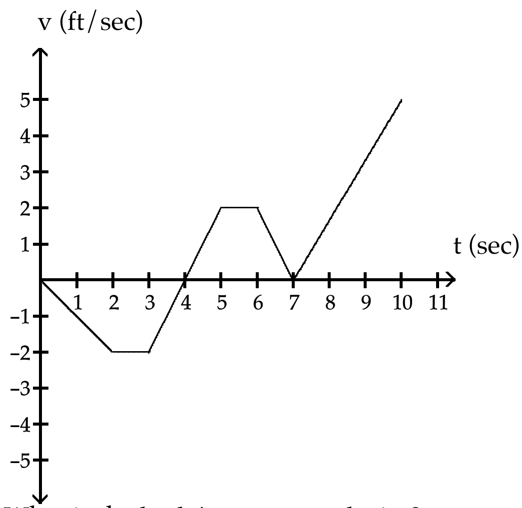
Find the indicated derivative.

242) Find $y^{(4)}$ if $y = -8 \cos x$. 242)

A) $y^{(4)} = 8 \sin x$ B) $y^{(4)} = -8 \sin x$ C) $y^{(4)} = -8 \cos x$ D) $y^{(4)} = 8 \cos x$

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

243) 243)



What is the body's greatest velocity?

A) 4 ft/sec B) 3 ft/sec C) 2 ft/sec D) 5 ft/sec

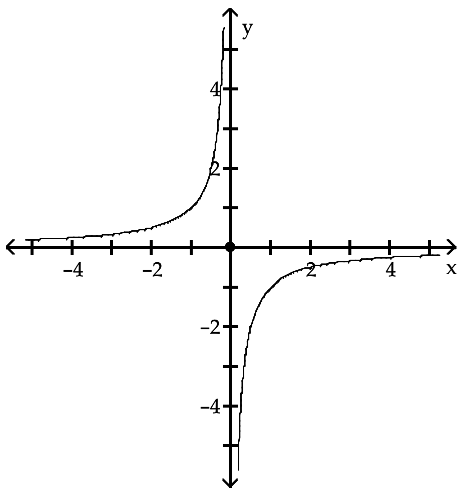
Find the value of $(f \circ g)'$ at the given value of x.

244) $f(u) = \frac{u}{u^2 - 1}$, $u = g(x) = 7x^2 + x + 4$, $x = 0$ 244)

A) $\frac{1}{15}$ B) $-\frac{17}{225}$ C) $\frac{47}{225}$ D) $\frac{17}{225}$

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?

245) $x = 0$ 245)



A) Differentiable

B) Continuous but not differentiable

C) Neither continuous nor differentiable

Solve the problem.

246) The position(in feet) of an object oscillating up and down at the end of a spring is given by $s = A \sin\left(\sqrt{\frac{k}{m}}t\right)$ at time t (in seconds). The value of A is the amplitude of the motion, k is a measure of the stiffness of the spring, and m is the mass of the object. Find the object's velocity at time t. 246)

A) $v = A \cos\left(\sqrt{\frac{k}{m}}t\right)$ ft/sec B) $v = A\sqrt{\frac{k}{m}} \cos\left(\sqrt{\frac{k}{m}}t\right)$ ft/sec

C) $v = -A\sqrt{\frac{k}{m}} \cos\left(\sqrt{\frac{k}{m}}t\right)$ ft/sec D) $v = A\sqrt{\frac{m}{k}} \cos\left(\sqrt{\frac{k}{m}}t\right)$ ft/sec

The function s = f(t) gives the position of a body moving on a coordinate line, with s in meters and t in seconds.

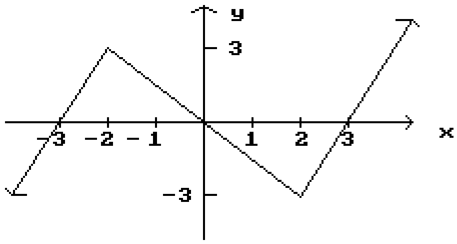
247) $s = 6t^2 + 4t + 4$, $0 \le t \le 2$ 247)

Find the body's displacement and average velocity for the given time interval.

A) 40 m, 20 m/sec B) 32 m, 16 m/sec C) 32 m, 32 m/sec D) 20 m, 28 m/sec

Given the graph of f, find any values of x at which f' is not defined.

248) 248)



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

Find the derivative of the function.

249) $r = \left(\frac{1 + 6\theta}{6\theta}\right)(6 - \theta)$ 249)

A) $\frac{dr}{d\theta} = \frac{1}{\theta^2} + 6$ B) $\frac{dr}{d\theta} = \theta^2 - 1$ C) $\frac{dr}{d\theta} = \frac{1}{\theta^2} + 1$ D) $\frac{dr}{d\theta} = -\frac{1}{\theta^2} - 1$

The function f(x) changes value when x changes from x_0 to $x_0 + dx$. Find the approximation error $|\triangle f - df|$. Round your answer, if appropriate.

250) $f(x) = x + x^2, x_0 = 3, dx = 0.02$ 250)

A) 0.0008 B) 0.0004 C) 0.05616 D) 0.02808

Solve the problem.

251) A manufacturer contracts to mint coins for the federal government. How much variation dr in the radius of the coins can be tolerated if the coins are to weigh within 1/50 of their ideal weight? Assume that the thickness does not vary. 251)

A) 0.020% B) 1.0% C) 0.010% D) 2.0%

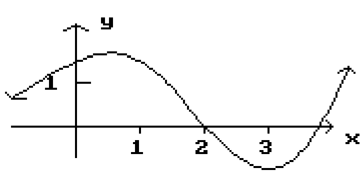
Find dy.

252) $y = 7\sqrt{x} + \frac{9}{x}$ 252)

A) $\left(\frac{7\sqrt{x}}{2} - \frac{9}{x^2}\right)dx$ B) $\left(\frac{7}{2\sqrt{x}} - \frac{9}{x^2}\right)dx$ C) $\left(\frac{7\sqrt{x}}{2} + \frac{9}{x^2}\right)dx$ D) $\left(\frac{7}{2\sqrt{x}} + \frac{9}{x^2}\right)dx$

Given the graph of f, find any values of x at which f' is not defined.

253) 253)



A) $x = 1, 3$ B) $x = 2$

C) $x = 1, 2, 3$ D) Defined for all values of x

Solve the problem.

254) The driver of a car traveling at 48 ft/sec suddenly applies the brakes. The position of the car is $s = 48t - 3t^2$, t seconds after the driver applies the brakes. How far does the car go before coming to a stop? 254)

A) 8 ft B) 768 ft C) 384 ft D) 192 ft

Find the derivative.

255) $y = 5x^2 + 10x + 5x^{-3}$ 255)

A) $10x + 10 + 15x^{-4}$ B) $10x + 10 - 15x^{-4}$ C) $10x - 15x^{-4}$ D) $5x + 5x^{-4}$

Find the derivative of the function.

256) $y = \frac{1}{5}(7x + 10)^3 + \left(1 - \frac{1}{x^3}\right)^{-1}$ 256)

A) $y' = \frac{3}{5}(7x)^2 - \left(\frac{3}{x^4}\right)^{-2}$ B) $y' = \frac{7}{5}(7x + 10)^2 + \frac{3}{x^4}\left(1 - \frac{1}{x^3}\right)^{-2}$

C) $y' = \frac{21}{5}(7x + 10)^2 - \frac{3}{x^4}\left(1 - \frac{1}{x^3}\right)^{-2}$ D) $y' = \frac{3}{5}(7x + 10)^2 - \left(1 - \frac{1}{x^3}\right)^{-2}$

Solve the problem.

257) The number of gallons of water in a swimming pool t minutes after the pool has started to drain is $Q(t) = 50(20 - x)^2$. How fast is the water running out at the end of 11 minutes? 257)

A) 4050 gal/min B) 450 gal/min C) 900 gal/min D) 2025 gal/min

Find an equation for the line tangent to the curve at the point defined by the given value of t.

258) $x = \csc t,\ y = 12 \cot t,\ t = \frac{\pi}{3}$ 258)

A) $y = -24x + 12\sqrt{3}$ B) $y = 24x + 4\sqrt{3}$ C) $y = 4\sqrt{3}x - 24$ D) $y = 24x - 12\sqrt{3}$

Suppose u and v are differentiable functions of x. Use the given values of the functions and their derivatives to find the value of the indicated derivative.

259) $u(1) = 5,\ u'(1) = -6,\ v(1) = 7,\ v'(1) = -4.$ 259)

$\frac{d}{dx}\left(\frac{v}{u}\right)$ at $x = 1$

A) $\frac{22}{25}$ B) $-\frac{22}{25}$ C) $-\frac{62}{25}$ D) $\frac{22}{5}$

Given y = f(u) and u = g(x), find dy/dx = f′(g(x))g′(x).

260) $y = u(u - 1),\ u = x^2 + x$ 260)

A) $4x^3 + 6x^2 - 2x$ B) $2x^2 + 4x + 1$ C) $2x^2 + 4x$ D) $4x^3 + 6x^2 - 1$

Solve the problem.

261) The driver of a car traveling at 60 ft/sec suddenly applies the brakes. The position of the car is $s = 60t - 3t^2$, t seconds after the driver applies the brakes. How many seconds after the driver applies the brakes does the car come to a stop? 261)

A) 60 sec B) 10 sec C) 30 sec D) 20 sec

Use the linear approximation $(1 + x)^k \approx 1 + kx$, as specified.

262) Estimate $(1.0003)^{50}$. 262)

A) 1.003 B) 1.03 C) 1.006 D) 1.015

Find the derivative of the function.

263) $y = (\sin x)^{-1/2}$ 263)

A) $y' = -\dfrac{\cos x}{2(\sin x)^{3/2}}$

B) $y' = \dfrac{\cos x}{(\sin x)^{3/2}}$

C) $y' = \dfrac{1}{2(\cos x)^{3/2}}$

D) $y' = -\dfrac{1}{2(\sin x)^{3/2}}$

Find the derivative.

264) $y = 6 - 9x^2$ 264)

A) $-18x$ B) $6 - 18x$ C) -18 D) $6 - 9x$

Solve the problem. Round your answer, if appropriate.

265) One airplane is approaching an airport from the north at 214 km/hr. A second airplane approaches from the east at 248 km/hr. Find the rate at which the distance between the planes changes when the southbound plane is 32 km away from the airport and the westbound plane is 25 km from the airport. 265)

A) –160 km/hr B) –321 km/hr C) –481 km/hr D) –642 km/hr

Find the slope of the tangent line at the given value of the independent variable.

266) $g(x) = \dfrac{8}{9 + x}$, $x = 3$ 266)

A) $\dfrac{1}{18}$ B) $-\dfrac{1}{18}$ C) $\dfrac{2}{3}$ D) $-\dfrac{2}{3}$

Find dy.

267) $6y^{1/2} - 2xy + x = 0$ 267)

A) $\left(\dfrac{-1}{3y^{-1/2} - 2x}\right)dx$

B) $\left(\dfrac{2y - 1}{3y^{-1/2} - 2x}\right)dx$

C) $\left(\dfrac{2y - 1}{3y^{-1/2} + 2x}\right)dx$

D) $\left(\dfrac{2y - 1}{6y - 2x}\right)dx$

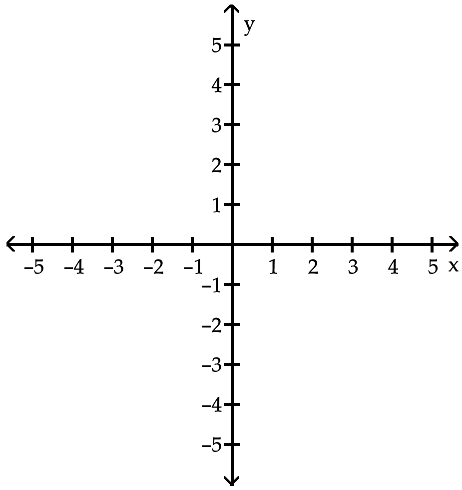
Use implicit differentiation to find dy/dx.

268) $2xy - y^2 = 1$ 268)

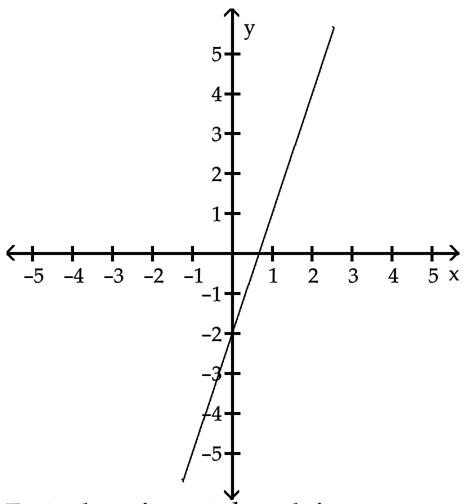
A) $\dfrac{y}{x - y}$ B) $\dfrac{y}{y - x}$ C) $\dfrac{x}{x - y}$ D) $\dfrac{x}{y - x}$

Parametric equations and and a parameter interval for the motion of a particle in the xy–plane are given. Identify the particle's path by finding a Cartesian equation for it. Graph the Cartesian equation. Indicate the portion of the graph traced by the particle and the direction of motion.

269) $x = 4t + 3$, $y = 12t + 11$, $-\infty \le t \le \infty$ 269)

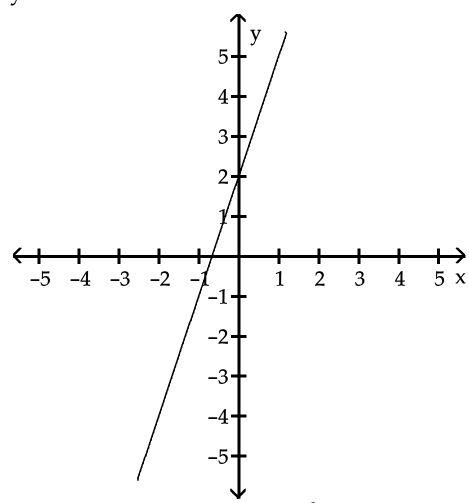


A) $y = 3x - 2$



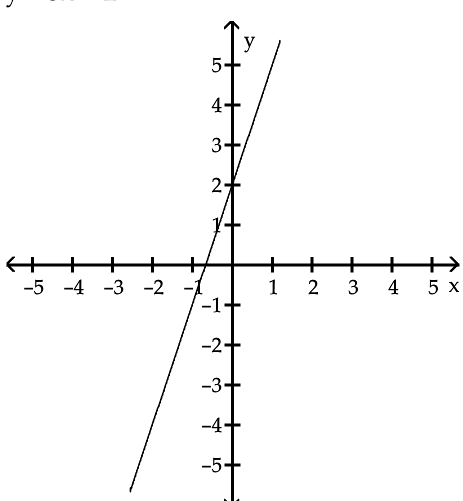
Entire line, from right to left

B) $y = 3x + 2$



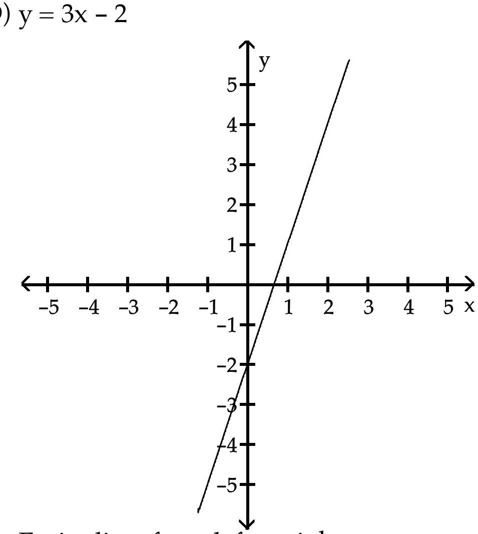
Entire line, from left to right

C) $y = 3x + 2$



Entire line, from right to left

D) $y = 3x - 2$



Entire line, from left to right

Find the derivative of the function.

270) $h(x) = \left(\dfrac{\cos x}{1 + \sin x}\right)^4$ 270)

A) $h'(x) = 4\left(\dfrac{\cos x}{1 + \sin x}\right)^3$

B) $h'(x) = \dfrac{-4\cos^3 x}{(1 + \sin x)^4}$

C) $h'(x) = \left(-\dfrac{4\sin x}{\cos x}\right)\left(\dfrac{\cos x}{1 + \sin x}\right)^3$

D) $h'(x) = -4\left(\dfrac{\sin x}{\cos x}\right)^3$

Find y′.

271) $y = \left(\dfrac{1}{x} + 3\right)\left(x - \dfrac{1}{x} + 3\right)$ 271)

A) $\dfrac{2}{x^3} + 3$

B) $-\dfrac{1}{x^3} - 3$

C) $\dfrac{1}{x^3} + 3$

D) $-\dfrac{2}{x^3} - 3$

Use implicit differentiation to find dy/dx.

272) $y\sqrt{x + 1} = 4$ 272)

A) $-\dfrac{y}{2(x + 1)}$

B) $\dfrac{2y}{x + 1}$

C) $\dfrac{y}{2(x + 1)}$

D) $-\dfrac{2y}{x + 1}$

Solve the problem. Round your answer, if appropriate.

273) A man 6 ft tall walks at a rate of 3 ft/sec away from a lamppost that is 21 ft high. At what rate is the length of his shadow changing when he is 30 ft away from the lamppost? (Do not round your answer) 273)

A) $\dfrac{2}{3}$ ft/sec

B) 15 ft/sec

C) $\dfrac{1}{3}$ ft/sec

D) $\dfrac{6}{5}$ ft/sec

The function f(x) changes value when x changes from x_0 to $x_0 + dx$. Find the approximation error $|\Delta f - df|$. Round your answer, if appropriate.

274) $f(x) = \sqrt{x}$, $x_0 = 9$, $dx = 0.04$ 274)

A) −0.00001

B) 0.00001

C) 0.00667

D) −0.00667

Assuming that the equations define x and y implicitly as differentiable functions x = f(t), y = g(t), find the slope of the curve x = f(t), y = g(t) at the given value of t.

275) $x = t\sin t + t$, $y\cos t + y = 2t$, $t = \dfrac{\pi}{2}$ 275)

A) $2 + \pi$

B) $\dfrac{2}{2 + \pi}$

C) $\dfrac{2 + \pi}{2}$

D) $-\dfrac{2}{2 + \pi}$

Find the value of d^2y/dx^2 at the point defined by the given value of t.

276) $x = \sin t$, $y = 2\sin t$, $t = \dfrac{\pi}{3}$ 276)

A) 4

B) −4

C) 0

D) −2

Use the linear approximation $(1 + x)^k \approx 1 + kx$, as specified.

277) Find an approximation for the function $f(x) = (1 - x)^6$ for values of x near zero. 277)

A) $f(x) \approx 1 - 6x$

B) $f(x) \approx 6 + 6x$

C) $f(x) \approx 1 + 6x$

D) $f(x) \approx 1 + 7x$

Find the value of $(f \circ g)'$ at the given value of x.

278) $f(u) = u^3$, $u = g(x) = \dfrac{x + 4}{x - 2}$, $x = 1$ 278)

A) -450 B) 75 C) -75 D) 450

Find dy.

279) $y = 3 \cot\left(\dfrac{1}{4}x^4\right)$ 279)

A) $-3x^4 \csc^2\left(\dfrac{1}{4}x^4\right) dx$ B) $3x^3 \csc^2\left(\dfrac{1}{4}x^4\right) dx$

C) $-3x^3 \csc\left(\dfrac{1}{4}x^4\right) dx$ D) $-3x^3 \csc^2\left(\dfrac{1}{4}x^4\right) dx$

Solve the problem.

280) At the two points where the curve $x^2 - xy + y^2 = 36$ crosses the x-axis, the tangents to the curve are parallel. What is the common slope of these tangents? 280)

A) 2 B) -2 C) -1 D) 1

281) Find the tangent to $y = 2 - \sin x$ at $x = \pi$. 281)

A) $y = x - \pi + 2$ B) $y = -x + 2$ C) $y = -x + \pi - 2$ D) $y = x - 2$

Find the derivative of the function.

282) $y = \sqrt{\sqrt{x} + 7}$ 282)

A) $y' = \dfrac{1}{4\sqrt{\sqrt{x} + 7}}$ B) $y' = \dfrac{1}{4\sqrt{x}(\sqrt{\sqrt{x} + 7})}$

C) $y' = \dfrac{1}{4\sqrt{x + 7}}$ D) $y' = \dfrac{1}{2\sqrt{\sqrt{x} + 7}}$

Use the linear approximation $(1 + x)^k \approx 1 + kx$, as specified.

283) Estimate $\sqrt[3]{1.012}$. 283)

A) 1.04 B) 1.004 C) 1.05 D) 1.005

Find the limit.

284) $\lim\limits_{t \to 0} \sec\left(\dfrac{-2\pi t}{\sin t}\right)$ 284)

A) 1 B) $-\dfrac{1}{2}$ C) -1 D) 0

Find the derivative.

285) $y = 6 - 3x^3$ 285)

A) $-6x^2$ B) $6 - 9x^2$ C) $-9x$ D) $-9x^2$

The function f(x) changes value when x changes from x_0 to $x_0 + dx$. Find the approximation error $|\triangle f - df|$. Round your answer, if appropriate.

286) $f(x) = x^2 - x$, $x_0 = 4$, $dx = 0.05$ 286)

A) 0.2025 B) 0.0025 C) 0.005 D) 0.2

Solve the problem.

287) The diameter of a tree was 11 in. During the following year, the circumference increased 2 in. About how much did the tree's diameter increase? (Leave your answer in terms of π.) 287)

A) $\frac{2}{\pi}$ in. B) $\frac{11}{\pi}$ in. C) $\frac{\pi}{2}$ in. D) $\frac{13}{\pi}$ in.

Find the derivative of the function.

288) $y = \cos^4(\pi t - 8)$ 288)

A) $\frac{dy}{dt} = -4\cos^3(\pi t - 8)\sin(\pi t - 8)$

B) $\frac{dy}{dt} = -4\pi\cos^3(\pi t - 8)\sin(\pi t - 8)$

C) $\frac{dy}{dt} = 4\cos^3(\pi t - 8)$

D) $\frac{dy}{dt} = -4\pi\sin^3(\pi t - 8)$

Find dy.

289) $y = 8x^2 - 8x - 6$ 289)

A) $(16x - 8)\,dx$ B) $16x\,dx$ C) $16x - 16\,dx$ D) $16x - 6\,dx$

Use implicit differentiation to find dy/dx and d^2y/dx^2.

290) $xy - x + y = 5$ 290)

A) $\frac{dy}{dx} = \frac{y+1}{x+1}; \frac{d^2y}{dx^2} = \frac{2y+2}{(x+1)^2}$

B) $\frac{dy}{dx} = -\frac{1+y}{x+1}; \frac{d^2y}{dx^2} = \frac{y+1}{(x+1)^2}$

C) $\frac{dy}{dx} = -\frac{1+y}{x+1}; \frac{d^2y}{dx^2} = \frac{2y-2}{(x+1)^2}$

D) $\frac{dy}{dx} = \frac{1-y}{1+x}; \frac{d^2y}{dx^2} = \frac{2y-2}{(x+1)^2}$

Suppose that the functions f and g and their derivatives with respect to x have the following values at the given values of x. Find the derivative with respect to x of the given combination at the given value of x.

291) 291)

x	f(x)	g(x)	f′(x)	g′(x)
3	1	9	6	7
4	−3	3	5	−4

$\sqrt{f(x) + g(x)}$, $x = 3$

A) $\frac{1}{2\sqrt{10}}$ B) $\frac{13}{2\sqrt{10}}$ C) $-\frac{1}{2\sqrt{10}}$ D) $\frac{13}{\sqrt{10}}$

Solve the problem.

292) The range R of a projectile is related to the initial velocity v and projection angle θ by the equation $R = \frac{v^2 \sin 2\theta}{g}$, where g is a constant. How is dR/dt related to dv/dt if θ is constant? 292)

A) $\frac{dR}{dt} = \frac{2v}{g}\frac{dv}{dt}$

B) $\frac{dR}{dt} = \frac{2v^2 \cos 2\theta}{g}\frac{dv}{dt}$

C) $\frac{dR}{dt} = \frac{2v \sin 2\theta}{g}\frac{dv}{dt}$

D) $\frac{dR}{dt} = \frac{2v \cos 2\theta}{g}\frac{dv}{dt}$

Use the linear approximation $(1 + x)^k \approx 1 + kx$, as specified.

293) Find an approximation for the function $f(x) = \dfrac{1}{\sqrt{6 + x}}$ for values of x near zero. 293)

A) $f(x) \approx -3 - \dfrac{1}{2}x$ B) $f(x) \approx 1 + \dfrac{1}{2}x$ C) $f(x) \approx -3 + \dfrac{1}{2}x$ D) $f(x) \approx 1 - \dfrac{1}{2}x$

Find the derivative.

294) $y = \dfrac{1}{13x^2} + \dfrac{1}{11x}$ 294)

A) $-\dfrac{1}{13x^3} + \dfrac{1}{11x^2}$ B) $-\dfrac{2}{13x^3} - \dfrac{1}{11x^2}$ C) $-\dfrac{2}{13x} - \dfrac{1}{11x^2}$ D) $\dfrac{2}{13x^3} + \dfrac{1}{11x^2}$

Use the linear approximation $(1 + x)^k \approx 1 + kx$, as specified.

295) Find an approximation for the function $f(x) = \dfrac{2}{1 - x}$ for values of x near zero. 295)

A) $f(x) \approx 1 + 2x$ B) $f(x) \approx 2 + 2x$ C) $f(x) \approx 2 - 2x$ D) $f(x) \approx 1 - 2x$

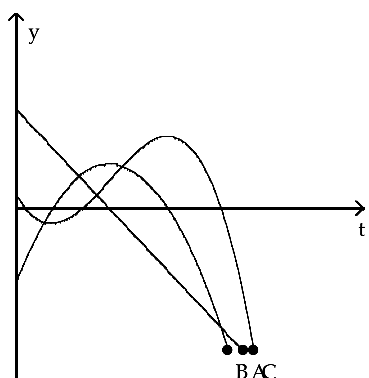
Find the second derivative.

296) $w = z^{-2} - \dfrac{1}{z}$ 296)

A) $6z^{-4} + \dfrac{2}{z^3}$ B) $6z^{-4} - \dfrac{2}{z^3}$ C) $-2z^{-3} + \dfrac{1}{z^2}$ D) $-2z^{-4} - \dfrac{2}{z^3}$

The graphs show the position s, velocity v = ds/dt, and acceleration a = d^2s/dt^2 of a body moving along a coordinate line as functions of time t. Which graph is which?

297) 297)



A) B = position, C = velocity, A = acceleration B) B = position, A = velocity, C = acceleration

C) C = position, B = velocity, A = acceleration D) C = position, A = velocity, B = acceleration

Find the second derivative.

298) $y = 5x^3 - 6x^2 + 4$ 298)

A) $20x - 12$ B) $12x - 30$ C) $12x - 20$ D) $30x - 12$

Assuming that the equations define x and y implicitly as differentiable functions x = f(t), y = g(t), find the slope of the curve x = f(t), y = g(t) at the given value of t.

299) $2x - t^2 - t = 0,\ 2ty + 5t^2 = 5,\ t = 1$ 299)

A) $\frac{15}{2}$ B) $-\frac{15}{2}$ C) -5 D) $-\frac{10}{3}$

Solve the problem.

300) A rock is thrown vertically upward from the surface of an airless planet. It reaches a height of $s = 120t - 10t^2$ meters in t seconds. How high does the rock go? How long does it take the rock to reach its highest point? 300)

A) 1320 m, 12 sec B) 720 m, 12 sec C) 360 m, 6 sec D) 714 m, 6 sec

Calculate the derivative of the function. Then find the value of the derivative as specified.

301) $g(x) = 3x^2 - 4x;\ g'(3)$ 301)

A) $g'(x) = 3x - 4;\ g'(3) = 5$ B) $g'(x) = 2x - 4;\ g'(3) = 2$

C) $g'(x) = 6x;\ g'(3) = 18$ D) $g'(x) = 6x - 4;\ g'(3) = 14$

The function s = f(t) gives the position of a body moving on a coordinate line, with s in meters and t in seconds.

302) $s = 7t - t^2,\ 0 \le t \le 7$ 302)

Find the body's displacement and average velocity for the given time interval.

A) –98 m, –14 m/sec B) 98 m, 14 m/sec

C) 98 m, –7 m/sec D) 0 m, 0 m/sec

Find an equation of the tangent line at the indicated point on the graph of the function.

303) $y = f(x) = x^2 + 3,\ (x, y) = (3, 12)$ 303)

A) $y = 6x - 12$ B) $y = 6x - 15$ C) $y = 6x - 6$ D) $y = 3x - 6$

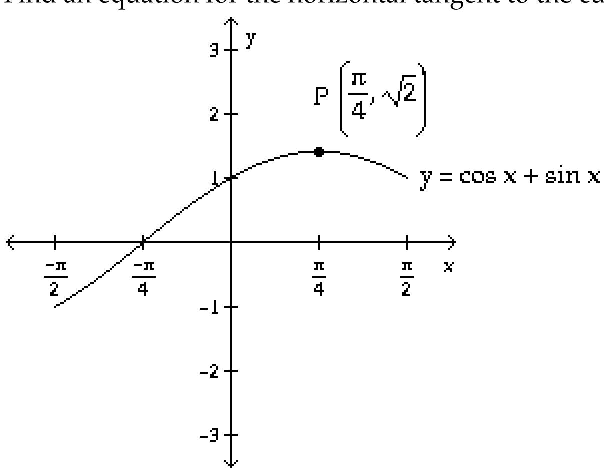
Find the value of $(f \circ g)'$ at the given value of x.

304) $f(u) = \frac{1}{u} + 11,\ u = g(x) = \frac{1}{x^2 - 11},\ x = 8$ 304)

A) –27 B) 64 C) 16 D) 8

Solve the problem.

305) Find an equation for the horizontal tangent to the curve at P. 305)



A) $y = \frac{3}{2}$ B) $y = 0$ C) $y = \sqrt{2}$ D) $y = 1$

Write the function in the form y = f(u) and u = g(x). Then find dy/dx as a function of x.

306) $y = \csc(\cot x)$ 306)

A) $y = \csc u;\ u = \cot x;\ \frac{dy}{dx} = \csc(\cot x)\cot(\cot x)\csc^2 x$

B) $y = \csc u;\ u = \cot x;\ \frac{dy}{dx} = -\csc(\cot x)\cot(\cot x)$

C) $y = \csc u;\ u = \cot x;\ \frac{dy}{dx} = \csc^3 x \cot x$

D) $y = \cot u;\ u = \csc x;\ \frac{dy}{dx} = \csc^2(\csc x)\csc x \cot x$

Suppose that the functions f and g and their derivatives with respect to x have the following values at the given values of x. Find the derivative with respect to x of the given combination at the given value of x.

307) 307)

x	f(x)	g(x)	f′(x)	g′(x)
3	1	4	8	5
4	3	3	5	–5

$g(x + f(x)),\ x = 3$

A) –40 B) –45 C) –5 D) 27

Use implicit differentiation to find dy/dx.

308) $\frac{x+y}{x-y} = x^2 + y^2$ 308)

A) $\frac{x(x-y)^2 - y}{x + y(x-y)^2}$ B) $\frac{x(x-y)^2 - y}{x - y(x-y)^2}$ C) $\frac{x(x-y)^2 + y}{x + y(x-y)^2}$ D) $\frac{x(x-y)^2 + y}{x - y(x-y)^2}$

At the given point, find the slope of the curve, the line that is tangent to the curve, or the line that is normal to the curve, as requested.

309) $y^6 + x^3 = y^2 + 12x$, tangent at (0, 1) 309)

A) $y = 2x + 1$ B) $y = -\frac{3}{2}x$ C) $y = 3x + 1$ D) $y = -2x - 1$

Find dy.

310) $y = \sin(2x^2)$ 310)

A) $-4\cos(2x^2)\,dx$ B) $4x\cos(2x^2)\,dx$ C) $4\cos(2x^2)\,dx$ D) $-4x\cos(2x^2)\,dx$

Solve the problem.

311) Find all points on the curve $y = \cos x$, $0 \le x \le 2\pi$, where the tangent line is parallel to the line $y = -x$. 311)

A) $\left(\frac{\pi}{2}, 0\right)$ B) $(\pi, -1)$ C) $(2\pi, 1)$ D) $\left(\frac{3\pi}{2}, 0\right)$

Assuming that the equations define x and y implicitly as differentiable functions x = f(t), y = g(t), find the slope of the curve x = f(t), y = g(t) at the given value of t.

312) $x \cos t + x = 2t,\ y = t \sin t + t,\ t = \frac{\pi}{2}$ 312)

A) $\frac{1}{1+\pi}$ B) $\frac{2}{2+\pi}$ C) $2 + \pi$ D) 2

Solve the problem.

313) The radius of a ball is claimed to be 4.5 inches, with a possible error of 0.05 inch. Use differentials to approximate the maximum possible error in calculating the volume of the sphere and the surface area of the sphere. 313)

A) 1.8π in.^{3}; 4.05π in.^{2}
B) 0.9π in.^{3}; 18π in.^{2}
C) 8.1π in.^{3}; 3.6π in.^{2}
D) 4.05π in.^{3}; 1.8π in.^{2}

Find the derivative.

314) $y = (\csc x + \cot x)(\csc x - \cot x)$ 314)

A) $y' = 0$
B) $y' = -\csc^2 x$
C) $y' = -\csc x \cot x$
D) $y' = 1$

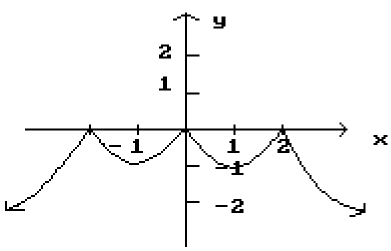
Find the derivative of the function.

315) $g(x) = \dfrac{x^2 + 5}{x^2 + 6x}$ 315)

A) $g'(x) = \dfrac{x^4 + 6x^3 + 5x^2 + 30x}{x^2(x + 6)^2}$
B) $g'(x) = \dfrac{2x^3 - 5x^2 - 30x}{x^2(x + 6)^2}$
C) $g'(x) = \dfrac{6x^2 - 10x - 30}{x^2(x + 6)^2}$
D) $g'(x) = \dfrac{4x^3 + 18x^2 + 10x + 30}{x^2(x + 6)^2}$

Given the graph of f, find any values of x at which f' is not defined.

316) 316)



A) $x = 0$
B) $x = -2, 0, 2$
C) $x = -2, 2$
D) Defined for all values of x

Find y'.

317) $y = (4x - 2)(3x + 1)$ 317)

A) $24x - 2$
B) $24x - 1$
C) $12x - 2$
D) $24x - 10$

Find the derivative of the function.

318) $s = \dfrac{t^8 + 5t + 8}{t^2}$ 318)

A) $\dfrac{ds}{dt} = 16t^{10} + 9t^2 + 16t$
B) $\dfrac{ds}{dt} = 6t^5 - \dfrac{5}{t^2} - \dfrac{16}{t^3}$
C) $\dfrac{ds}{dt} = 6t^5 + \dfrac{5}{t^2} + \dfrac{16}{t^3}$
D) $\dfrac{ds}{dt} = t^5 - \dfrac{5}{t^2} - \dfrac{8}{t^3}$

Find an equation of the tangent line at the indicated point on the graph of the function.

319) $y = f(x) = x^2 - x$, $(x, y) = (-2, 6)$ 319)

A) $y = -5x + 4$
B) $y = -5x + 2$
C) $y = -5x - 4$
D) $y = -5x - 2$

Find the second derivative.

320) $y = 3x^2 + 8x + 4x^{-3}$ 320)

A) $6 + 48x^{-1}$ B) $6 + 48x^{-5}$ C) $6 - 48x^{-5}$ D) $6x + 8 - 12x^{-4}$

You want a linearization that will replace the function over an interval that includes the point x_0. To make your subsequent work as simple as possible, you want to center the linearization not at x_0 but at a nearby integer $x = a$ at which the function and its derivative are easy to evaluate. What linearization do you use?

321) $f(x) = \frac{x}{x + 1}$, $x_0 = 3.8$ 321)

A) $\frac{1}{25} + \frac{16}{25}x$ B) $\frac{1}{25} + \frac{4}{25}x$ C) $\frac{16}{25} + \frac{1}{25}x$ D) $\frac{4}{25} + \frac{1}{25}x$

Use implicit differentiation to find dy/dx and d^2y/dx^2.

322) $x^2 - y^3 = 4$ 322)

A) $\frac{dy}{dx} = \frac{2x}{3y^2}$; $\frac{d^2y}{dx^2} = \frac{6y^3 - 8x^2}{9y^5}$ B) $\frac{dy}{dx} = \frac{2x}{3y^2}$; $\frac{d^2y}{dx^2} = \frac{5y^3 - 8x^2}{9y^5}$

C) $\frac{dy}{dx} = \frac{2x}{3y^2}$; $\frac{d^2y}{dx^2} = \frac{6y^3 - 8x^2}{9y^6}$ D) $\frac{dy}{dx} = \frac{2x}{3y^2}$; $\frac{d^2y}{dx^2} = \frac{6y^3 - 8x^2}{9y^3}$

Find an equation of the tangent line at the indicated point on the graph of the function.

323) $y = f(x) = 6\sqrt{x} - x + 9$, $(x, y) = (36, 9)$ 323)

A) $y = 9$ B) $y = -\frac{1}{2}x + 27$ C) $y = -\frac{1}{2}x + 9$ D) $y = \frac{1}{2}x - 27$

Find the value of d^2y/dx^2 at the point defined by the given value of t.

324) $x = t + \cos t$, $y = 2 - \sin t$, $t = \frac{\pi}{6}$ 324)

A) $\frac{1}{4}$ B) -2 C) $-\sqrt{3}$ D) -4

Solve the problem. Round your answer, if appropriate.

325) Electrical systems are governed by Ohm's law, which states that V = IR, where V = voltage, I = current, and R = resistance. If the current in an electrical system is decreasing at a rate of 9 A/s while the voltage remains constant at 10 V, at what rate is the resistance increasing (in Ω/sec) when the current is 40 A? (Do not round your answer.) 325)

A) $\frac{9}{160}$ Ω/sec B) $\frac{4}{9}$ Ω/sec C) $\frac{81}{4}$ Ω/sec D) $\frac{9}{4}$ Ω/sec

At the given point, find the slope of the curve, the line that is tangent to the curve, or the line that is normal to the curve, as requested.

326) $2x^2y - \pi \cos y = 3\pi$, slope at $(1, \pi)$ 326)

A) -2π B) 0 C) $-\frac{\pi}{2}$ D) π

Solve the problem.

327) Find the tangent to $y = \cos x$ at $x = \frac{\pi}{2}$. 327)

A) $y = 1$ B) $y = -x - \frac{\pi}{2}$ C) $y = x + \frac{\pi}{2}$ D) $y = -x + \frac{\pi}{2}$

328) The position (in centimeters) of an object oscillating up and down at the end of a spring is given by $s = A \sin\left(\sqrt{\frac{k}{m}}\,t\right)$ at time t (in seconds). The value of A is the amplitude of the motion, k is a measure of the stiffness of the spring, and m is the mass of the object. How fast is the object moving when it is moving fastest? 328)

A) $\sqrt{\frac{k}{m}}$ cm/sec B) $A\sqrt{\frac{m}{k}}$ cm/sec C) $A\sqrt{\frac{k}{m}}$ cm/sec D) A cm/sec

329) Suppose that the velocity of a falling body is $v = ks^2$ (k a constant) at the instant the body has fallen s meters from its starting point. Find the body's acceleration as a function of s. 329)

A) $a = 2ks$ B) $a = 2k^2s^3$ C) $a = 2ks^3$ D) $a = 2ks^2$

At the given point, find the slope of the curve, the line that is tangent to the curve, or the line that is normal to the curve, as requested.

330) $4x^2y - \pi \cos y = 5\pi$, tangent at $(1, \pi)$ 330)

A) $y = -\frac{\pi}{2}x + \frac{3\pi}{2}$ B) $y = \pi x$ C) $y = -2\pi x + 3\pi$ D) $y = -2\pi x + \pi$

Suppose u and v are differentiable functions of x. Use the given values of the functions and their derivatives to find the value of the indicated derivative.

331) $u(2) = 7$, $u'(2) = 2$, $v(2) = -1$, $v'(2) = -5$. 331)

$\frac{d}{dx}\left(\frac{u}{v}\right)$ at $x = 2$

A) -33 B) -37 C) $\frac{33}{25}$ D) 33

Solve the problem.

332) Find the normal to the curve $x^2 + y^2 = 2x + 2y$ that is parallel to the line $y + x = 0$. 332)

A) $y = x + 2$ B) $y = -x - 2$ C) $y = -x + 2$ D) $y = x - 2$

333) A company knows that the unit cost C and the unit revenue R from the production and sale of x units are related by $C = \frac{R^2}{294{,}000} + 4168$. Find the rate of change of unit revenue when the unit cost is changing by \$8/unit and the unit revenue is \$2000. 333)

A) \$588.00/unit B) \$80.00/unit C) \$416.80/unit D) \$502.40/unit

Find the indicated derivative.

334) Find $y^{(4)}$ if $y = 3 \sin x$. 334)

A) $y^{(4)} = -3 \cos x$ B) $y^{(4)} = 3 \cos x$ C) $y^{(4)} = 3 \sin x$ D) $y^{(4)} = -3 \sin x$

Write the function in the form y = f(u) and u = g(x). Then find dy/dx as a function of x.

335) $y = (2x + 11)^3$ 335)

A) $y = 3u + 11;\ u = x^3;\ \dfrac{dy}{dx} = 6x^2$

B) $y = u^3;\ u = 2x + 11;\ \dfrac{dy}{dx} = 6(2x + 11)^2$

C) $y = u^3;\ u = 2x + 11;\ \dfrac{dy}{dx} = 2(2x + 11)^3$

D) $y = u^3;\ u = 2x + 11;\ \dfrac{dy}{dx} = 3(2x + 11)^2$

The equation gives the position s = f(t) of a body moving on a coordinate line (s in meters, t in seconds).

336) $s = 7 \sin t - \cos t$ 336)

Find the body's jerk at time $t = \pi/4$ sec.

A) $-4\sqrt{2}$ m/sec^3

B) $3\sqrt{2}\sqrt{2}$ m/sec^3

C) $-3\sqrt{2}\sqrt{2}$ m/sec^3

D) $4\sqrt{2}\sqrt{2}$ m/sec^3

Find an equation for the line tangent to the curve at the point defined by the given value of t.

337) $x = t,\ y = \sqrt{2t},\ t = 2$ 337)

A) $y = -\dfrac{1}{2}x$

B) $y = \dfrac{1}{2}x$

C) $y = -\dfrac{1}{2}x - 1$

D) $y = \dfrac{1}{2}x + 1$

Solve the problem.

338) Under standard conditions, molecules of a gas collide billions of times per second. If each molecule has diameter t, the average distance between collisions is given by 338)

$$L = \frac{1}{\sqrt{2}\pi t^2 n},$$

where n, the volume density of the gas, is a constant. Find $\dfrac{d^2L}{dt^2}$.

A) $\dfrac{d^2L}{dt^2} = -\dfrac{6}{\sqrt{2}\pi t^4 n}$

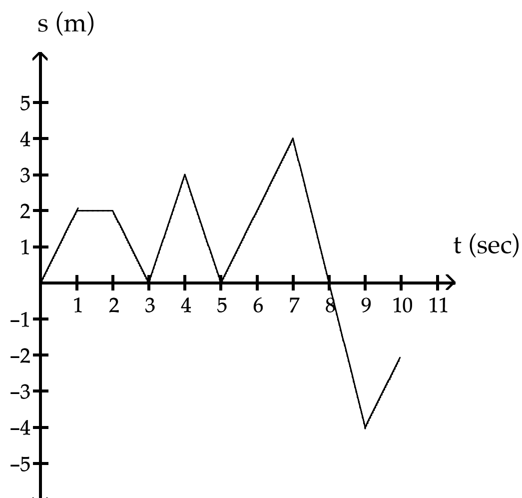
B) $\dfrac{d^2L}{dt^2} = -\dfrac{2}{\sqrt{2}\pi t^3 n}$

C) $\dfrac{d^2L}{dt^2} = -\dfrac{2}{\sqrt{2}\pi t^2 n}$

D) $\dfrac{d^2L}{dt^2} = \dfrac{6}{\sqrt{2}\pi t^4 n}$

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

339) 339)



What is the body's velocity when t = 8 sec?

A) 4 m/sec

B) 0 m/sec

C) 3 m/sec

D) −4 m/sec

Solve the problem.

340) The position of a particle moving along a coordinate line is $s = \sqrt{2 + 2t}$ with s in meters and t in seconds. Find the particle's acceleration at t = 1 sec. 340)

A) $\frac{1}{2}$ m/sec^2 B) $-\frac{1}{16}$ m/sec^2 C) $\frac{1}{8}$ m/sec^2 D) $-\frac{1}{8}$ m/sec^2

Find the second derivative.

341) $y = 8x^2 + 7x - 5$ 341)

A) 16 B) 8 C) 0 D) 16x + 7

Solve the problem.

342) Find the points on the curve $x^2 - xy + y^2 = 12$ where the tangent is parallel to the x-axis. 342)

A) (-2, -4), (-2, 2), (2, -2), (2, 4) B) (-2, -4), (2, 4)

C) (-4, -2), (-2, 2), (2, -2), (4, 2) D) (4, -2), (4, 2)

Find the indicated derivative.

343) Find y'' if $y = 9 \sin x$. 343)

A) $y'' = 9 \cos x$ B) $y'' = -9 \sin x$ C) $y'' = 81 \sin x$ D) $y'' = 9 \sin x$

Find the second derivative.

344) $r = \frac{4}{s^3} - \frac{8}{s}$ 344)

A) $\frac{4}{s^5} - \frac{8}{s^3}$ B) $-\frac{12}{s^4} + \frac{8}{s^2}$ C) $\frac{48}{s^5} + \frac{16}{s^3}$ D) $\frac{48}{s^5} - \frac{16}{s^3}$

Find the limit.

345) $\lim\limits_{x \to \pi/2} 2 \sin\left(\frac{\pi + \cot x}{\cos x + 2 \sin x}\right)$ 345)

A) 2 B) 4 C) 0 D) -2

Find the derivative.

346) $r = 20 - \theta^3 \cos \theta$ 346)

A) $\frac{dr}{d\theta} = 3\theta^2 \cos \theta - \theta^3 \sin \theta$ B) $\frac{dr}{d\theta} = 3\theta^2 \sin \theta$

C) $\frac{dr}{d\theta} = 3\theta^2 \sin \theta - \theta^3 \cos \theta$ D) $\frac{dr}{d\theta} = -3\theta^2 \cos \theta + \theta^3 \sin \theta$

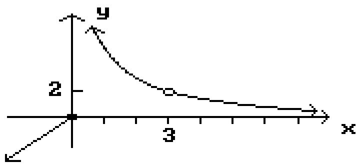
Find an equation of the tangent line at the indicated point on the graph of the function.

347) $s = h(t) = t^3 - 9t + 5$, (t, s) = (3, 5) 347)

A) s = 18t + 5 B) s = 18t - 49 C) s = 23t - 49 D) s = 5

Given the graph of f, find any values of x at which f' is not defined.

348) 348)



A) $x = 0$

B) $x = 3$

C) $x = 0, 3$

D) Defined for all values of x

Write a differential formula that estimates the given change in volume or surface area.

349) The change in the surface area $S = 4\pi r^2$ of a sphere when the radius changes from r_0 to $r_0 + dx$ 349)

A) $dS = 4\pi r_0\ dr$

B) $dS = 8\pi r_0\ dr$

C) $dS = 2\pi r_0\ dr$

D) $dS = 4\pi r_0{}^2\ dr$

Use implicit differentiation to find dy/dx.

350) $\cos xy + x^3 = y^3$ 350)

A) $\dfrac{3x^2 + y \sin xy}{3y^2 - x \sin xy}$

B) $\dfrac{3x^2 - y \sin xy}{3y^2 + x \sin xy}$

C) $\dfrac{3x^2 + x \sin xy}{3y^2}$

D) $\dfrac{3x^2 - x \sin xy}{3y^2}$

Find the derivative of the function.

351) $r = \dfrac{\sqrt{\theta} - 5}{\sqrt{\theta} + 5}$ 351)

A) $r' = -\dfrac{5}{\sqrt{\theta}(\theta + 5)^2}$

B) $r' = \dfrac{5}{\sqrt{\theta}(\theta + 5)^2}$

C) $r' = \dfrac{10}{(\theta + 5)\sqrt{\theta^2 - 25}}$

D) $r' = \dfrac{5}{\theta + 5}$

The equation gives the position s = f(t) of a body moving on a coordinate line (s in meters, t in seconds).

352) $s = 6 \sin t - \cos t$ 352)

Find the body's acceleration at time $t = \pi/4$ sec.

A) $\dfrac{7\sqrt{2}}{2}\ m/sec^2$

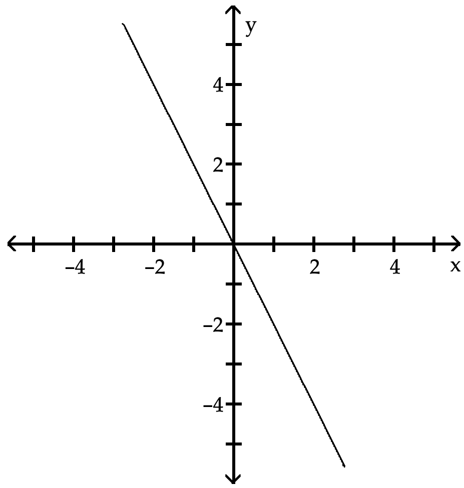
B) $\dfrac{5\sqrt{2}}{2}\ m/sec^2$

C) $-\dfrac{7\sqrt{2}}{2}\ m/sec^2$

D) $-\dfrac{5\sqrt{2}}{2}\ m/sec^2$

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?

353) $x = 0$ 353)



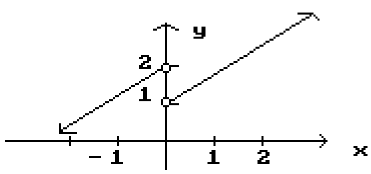
A) Differentiable

B) Continuous but not differentiable

C) Neither continuous nor differentiable

Given the graph of f, find any values of x at which f' is not defined.

354) 354)



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

Suppose u and v are differentiable functions of x. Use the given values of the functions and their derivatives to find the value of the indicated derivative.

355) $u(2) = 6$, $u'(2) = 2$, $v(2) = -1$, $v'(2) = -5$. 355)

$\frac{d}{dx}(2u - 4v)$ at $x = 2$

A) 24 B) 16 C) 8 D) -16

Solve the problem.

356) Under standard conditions, molecules of a gas collide billions of times per second. If each molecule has diameter t, the average distance between collisions is given by 356)

$$L = \frac{1}{\sqrt{2}\pi t^2 n},$$

where n, the volume density of the gas, is a constant. Find $\frac{dL}{dt}$.

A) $\frac{dL}{dt} = -\frac{2}{\sqrt{2}\pi t^3 n}$ B) $\frac{dL}{dt} = \frac{2}{\sqrt{2}\pi t^3 n}$ C) $\frac{dL}{dt} = \frac{1}{2\sqrt{2}\pi t^3 n}$ D) $\frac{dL}{dt} = -\frac{1}{\sqrt{2}\pi t n}$

357) The kinetic energy K of an object with mass m and velocity v is $K = \frac{1}{2}mv^2$. How is dm/dt related to dv/dt if K is constant? 357)

A) $\frac{dm}{dt} = -\frac{2m}{v}\frac{dv}{dt}$
B) $\frac{dm}{dt} = -2mv^3\frac{dv}{dt}$
C) $\frac{dm}{dt} = \frac{m}{v}\frac{dv}{dt}$
D) $\frac{dv}{dt} = -\frac{2m}{v}\frac{dm}{dt}$

Suppose u and v are differentiable functions of x. Use the given values of the functions and their derivatives to find the value of the indicated derivative.

358) $u(2) = 7$, $u'(2) = 4$, $v(2) = -3$, $v'(2) = -4$. 358)

$\frac{d}{dx}\left(\frac{v}{u}\right)$ at $x = 2$

A) $-\frac{16}{7}$
B) $-\frac{16}{49}$
C) $\frac{16}{49}$
D) $-\frac{40}{49}$

Find the indicated derivative.

359) Find y'' if $y = -2 \cos x$. 359)

A) $y'' = -2 \cos x$
B) $y'' = 2 \sin x$
C) $y'' = -2 \sin x$
D) $y'' = 2 \cos x$

Find dy.

360) $3x^2y - 6x^{1/2} - y = 0$ 360)

A) $\left(\frac{3x^{-1/2} - 6xy}{3x^2 - 1}\right)dx$
B) $\left(\frac{3x^{-1/2} + 6xy}{3x^2 - 1}\right)dx$
C) $\left(\frac{3x^{-1/2} + 6xy}{3x^2 + 1}\right)dx$
D) $\left(\frac{3x^{-1/2} - 6xy}{3x^2 + 1}\right)dx$

Find y''.

361) $y = 2 \cot\left(\frac{x}{6}\right)$ 361)

A) $4 \csc^2\left(\frac{x}{6}\right)\cot\left(\frac{x}{6}\right)$
B) $-4 \csc\left(\frac{x}{6}\right)$
C) $-\frac{1}{3}\csc^2\left(\frac{x}{6}\right)$
D) $\frac{1}{9}\csc^2\left(\frac{x}{6}\right)\cot\left(\frac{x}{6}\right)$

Calculate the derivative of the function. Then find the value of the derivative as specified.

362) $g(x) = x^3 + 5x$; $g'(1)$ 362)

A) $g'(x) = 3x^2$; $g'(1) = 3$
B) $g'(x) = x^2 + 5$; $g'(1) = 6$
C) $g'(x) = 3x^2 + 5x$; $g'(1) = 8$
D) $g'(x) = 3x^2 + 5$; $g'(1) = 8$

Suppose that the functions f and g and their derivatives with respect to x have the following values at the given values of x. Find the derivative with respect to x of the given combination at the given value of x.

363)

x	f(x)	g(x)	f′(x)	g′(x)
3	1	4	8	3
4	–3	3	2	–4

363)

$1/f^2(x)$, $x = 4$

A) $\frac{4}{27}$ B) $-\frac{4}{27}$ C) $\frac{2}{27}$ D) $-\frac{1}{4}$

The function s = f(t) gives the position of a body moving on a coordinate line, with s in meters and t in seconds.

364) $s = -t^3 + 7t^2 - 7t$, $0 \le t \le 7$ 364)

Find the body's displacement and average velocity for the given time interval.

A) 637 m, 91 m/sec B) 49 m, 7 m/sec

C) –49 m, –7 m/sec D) –49 m, –14 m/sec

Find the derivative.

365) $y = 2x^4 - 9x^3 - 3$ 365)

A) $4x^3 + 3x^2$ B) $8x^3 - 27x^2$ C) $8x^3 - 27x^2 - 7$ D) $4x^3 + 3x^2 - 7$

Solve the problem.

366) A runner is competing in an 8–mile race. As the runner passes each miles marker (M), a steward records the time elapsed in minutes (t) since the beginning of the race, as shown in the table. What is the runner's average speed over the first 5 miles? Round your answer to four decimal places. 366)

M	0	1	2	3	4	5	6	7	8
t	0	15	29	43	55	67	80	93	109

A) 0.0649 miles/min B) 13.4048 miles/min

C) 0.0746 miles/min D) 0.0862 miles/min

367) Does the graph of the function $y = 5x + 10 \sin x$ have any horizontal tangents in the interval $0 \le x \le 2\pi$? If so, where? 367)

A) Yes, at $x = \frac{\pi}{3}, x = \frac{2\pi}{3}$ B) Yes, at $x = \frac{2\pi}{3}, x = \frac{4\pi}{3}$

C) No D) Yes, at $x = \frac{2\pi}{3}$

Write the function in the form y = f(u) and u = g(x). Then find dy/dx as a function of x.

368) $y = \tan\left(\pi - \frac{7}{x}\right)$ 368)

A) $y = \tan u;\ u = \pi - \frac{7}{x};\ \frac{dy}{dx} = \frac{7}{x^2}\sec^2\left(\pi - \frac{7}{x}\right)$

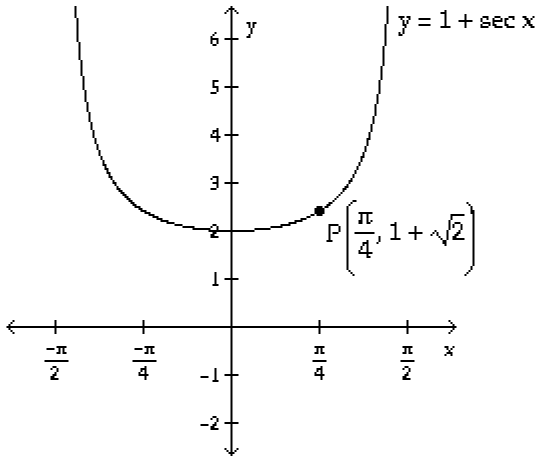
B) $y = \tan u;\ u = \pi - \frac{7}{x};\ \frac{dy}{dx} = \frac{7}{x^2}\sec\left(\pi - \frac{7}{x}\right)\tan\left(\pi - \frac{7}{x}\right)$

C) $y = \tan u;\ u = \pi - \frac{7}{x};\ \frac{dy}{dx} = \sec^2\left(\pi - \frac{7}{x}\right)$

D) $y = \tan u;\ u = \pi - \frac{7}{x};\ \frac{dy}{dx} = \sec^2\left(\frac{7}{x^2}\right)$

Solve the problem.

369) Find an equation for the tangent to the curve at P. 369)



A) $y = \sqrt{2}x - \frac{\pi\sqrt{2}}{4} + 1 + \sqrt{2}$

B) $y = -\sqrt{2}x + \frac{\pi\sqrt{2}}{4} - 1 - \sqrt{2}$

C) $y = \sqrt{2}x + 1 + \sqrt{2}$

D) $y = -\sqrt{2}x - 1 - \sqrt{2}$

370) Assume that the profit generated by a product is given by $P(x) = 4\sqrt{x}$, where x is the number of units sold. If the profit keeps changing at a rate of $600 per month, then how fast are the sales changing when the number of units sold is 300? (Round your answer to the nearest dollar per month.) 370)

A) $17/month B) $83,138/month C) $2598/month D) $5196/month

Find the linearization L(x) of f(x) at x = a.

371) $f(x) = \sqrt[3]{x}$, $a = 27$ 371)

A) $L(x) = \frac{1}{9}x + 1$ B) $L(x) = \frac{1}{9}x + 6$ C) $L(x) = \frac{1}{27}x + 1$ D) $L(x) = \frac{1}{27}x + 2$

Assuming that the equations define x and y implicitly as differentiable functions x = f(t), y = g(t), find the slope of the curve x = f(t), y = g(t) at the given value of t.

372) $2tx + 5t^2 = 5$, $2y - t^2 - t = 0$, $t = 1$ 372)

A) $-\frac{15}{2}$ B) $\frac{3}{10}$ C) $-\frac{3}{10}$ D) $\frac{3}{2}$

Solve the problem.

373) A heat engine is a device that converts thermal energy into other forms. The thermal efficiency, e, of a heat engine is defined by 373)

$$e = \frac{Q_h - Q_c}{Q_h},$$

where Q_h is the heat absorbed in one cycle and Q_c, the heat released into a reservoir in one cycle, is a constant. Find $\frac{de}{dQ_h}$.

A) $\frac{de}{dQ_h} = \frac{1}{{Q_h}^2}$ B) $\frac{de}{dQ_h} = -\frac{Q_c}{{Q_h}^2}$ C) $\frac{de}{dQ_h} = Q_h - Q_c$ D) $\frac{de}{dQ_h} = \frac{Q_c}{{Q_h}^2}$

374) At time t, the position of a body moving along the s–axis is $s = t^3 - 15t^2 + 72t$ m. Find the body's acceleration each time the velocity is zero. 374)

A) $a(6) = -6\ m/sec^2$, $a(4) = 6\ m/sec^2$
B) $a(12) = 72\ m/sec^2$, $a(8) = 12\ m/sec^2$
C) $a(6) = 0\ m/sec^2$, $a(4) = 0\ m/sec^2$
D) $a(6) = 6\ m/sec^2$, $a(4) = -6\ m/sec^2$

You want a linearization that will replace the function over an interval that includes the point x_0. To make your subsequent work as simple as possible, you want to center the linearization not at x_0 but at a nearby integer x = a at which the function and its derivative are easy to evaluate. What linearization do you use?

375) $f(x) = -5x^2 - 4x + 9$, $x_0 = 1.1$ 375)

A) 0
B) $-14 - 14x$
C) $15 - 15x$
D) $14 - 14x$

Find the derivative.

376) $y = \frac{9}{x} + 2 \sec x$ 376)

A) $y' = -\frac{9}{x^2} + 2 \tan^2 x$
B) $y' = \frac{9}{x^2} - 2 \sec x \tan x$
C) $y' = -\frac{9}{x^2} + 2 \sec x \tan x$
D) $y' = -\frac{9}{x^2} - 2 \csc x$

Solve the problem.

377) Suppose that the velocity of a falling body is $v = \frac{k}{s}$ (k a constant) at the instant the body has fallen s meters from its starting point. Find the body's acceleration as a function of s. 377)

A) $a = \frac{k^2}{s^3}$
B) $a = -\frac{1}{s^2}$
C) $a = -\frac{k^2}{s^3}$
D) $a = -\frac{k}{s^2}$

378) The curves $y = ax^2 + b$ and $y = 2x^2 + cx$ have a common tangent line at the point (–1, 0). Find a, b, and c. 378)

A) a = 1, b = –1, c = 2
B) a = 1, b = 0, c = 2
C) a – 2, b = 1, c = –1
D) a = –1, b = 1, c = –2

Find the derivative.

379) $y = \frac{\sin x}{9x} + \frac{9x}{\sin x}$ 379)

A) $\frac{dy}{dx} = \frac{x \cos x - \sin x}{9x^2} + \frac{9 \sin x - 9x \cos x}{\sin^2 x}$
B) $\frac{dy}{dx} = \frac{\cos x}{9} + \frac{9}{\cos x}$
C) $\frac{dy}{dx} = \frac{x \cos x + \sin x}{9x^2} + \frac{9 \sin x + 9x \cos x}{\sin^2 x}$
D) $\frac{dy}{dx} = \frac{\sin x - x \cos x}{81x^2} + \frac{9x \cos x - 9 \sin x}{\sin^2 x}$

Solve the problem.

380) At time $t \geq 0$, the velocity of a body moving along the s–axis is $v = t^2 - 11t + 10$. When is the body's velocity increasing? 380)

A) $t < 5.5$
B) $t < 10$
C) $t > 10$
D) $t > 5.5$

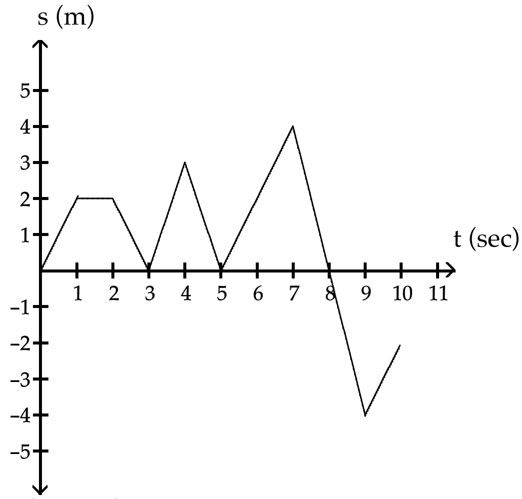
Find the second derivative.

381) $y = \frac{1}{7x^2} + \frac{1}{5x}$ 381)

A) $\frac{6}{7x^4} - \frac{2}{5x^3}$ B) $-\frac{2}{7x^3} - \frac{1}{5x^2}$ C) $\frac{6}{7x^4} + \frac{2}{5x^3}$ D) $-\frac{2}{7x^4} + \frac{1}{5x^3}$

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

382) 382)



When is the body moving forward?

A) $0 < t < 1, 3 < t < 4, 5 < t < 7, 9 < t < 10$ B) $0 < t < 1, 3 < t < 4, 5 < t < 7$

C) $0 < t < 3, 3 < t < 5, 5 < t < 8$ D) $0 < t < 8$

Given y = f(u) and u = g(x), find dy/dx = f′(g(x))g′(x).

383) $y = \sin u,\ u = 10x + 17$ 383)

A) $10 \cos (10x + 17)$ B) $-\cos (10x + 17)$

C) $\cos (10x + 17)$ D) $-10 \cos (10x + 17)$

Use implicit differentiation to find dy/dx and d^2y/dx^2.

384) $x^{3/5} + y^{3/5} = 7$ 384)

A) $\frac{dy}{dx} = -\frac{y^{2/5}}{x^{2/5}};\ \frac{d^2y}{dx^2} = \frac{2y^{1/5} - 2x}{5x^{7/5}y^{3/5}}$ B) $\frac{dy}{dx} = \frac{y^{2/5}}{x^{2/5}};\ \frac{d^2y}{dx^2} = -\frac{2x^{3/5} + 2y^{3/5}}{5x^{7/5}y^{1/5}}$

C) $\frac{dy}{dx} = -\frac{y^{2/5}}{x^{2/5}};\ \frac{d^2y}{dx^2} = \frac{2x^{3/5} + 2y^{3/5}}{5x^{7/5}y^{1/5}}$ D) $\frac{dy}{dx} = \frac{x^{2/5}}{y^{2/5}};\ \frac{d^2y}{dx^2} = -\frac{2x^{3/5} + 2y^{3/5}}{5x^{1/5}y^{7/5}}$

Solve the problem.

385) The area $A = \pi r^2$ of a circular oil spill changes with the radius. To the nearest tenth of a square foot, how much does the area increase when the radius changes from 6 ft to 6.1 ft? 385)

A) 3.8 ft^2 B) 18.8 ft^2 C) 2.4 ft^2 D) 37.7 ft^2

Find the derivative.

386) $p = \dfrac{9 + \sec q}{9 - \sec q}$ 386)

A) $\dfrac{dp}{dq} = \dfrac{18 \sin q}{(9 \cos q - 1)^2}$

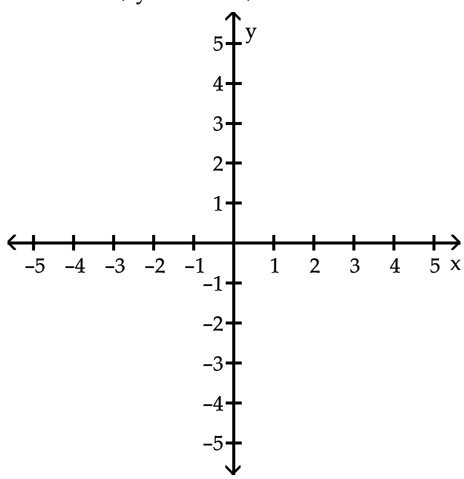
B) $\dfrac{dp}{dq} = -\dfrac{2 \sec^2 q \tan q}{(9 - \sec q)^2}$

C) $\dfrac{dp}{dq} = \dfrac{18 \tan^2 q}{(9 - \sec q)^2}$

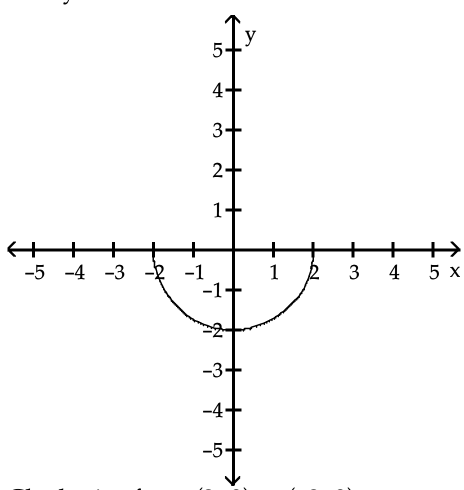
D) $\dfrac{dp}{dq} = -\dfrac{18 \sin q}{(9 \cos q - 1)^2}$

Parametric equations and and a parameter interval for the motion of a particle in the xy–plane are given. Identify the particle's path by finding a Cartesian equation for it. Graph the Cartesian equation. Indicate the portion of the graph traced by the particle and the direction of motion.

387) $x = 2 \cos t$, $y = 2 \sin t$, $\pi \le t \le 2\pi$ 387)

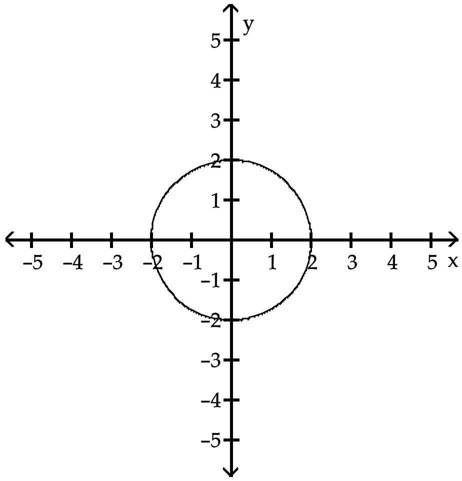


A) $x^2 + y^2 = 4$



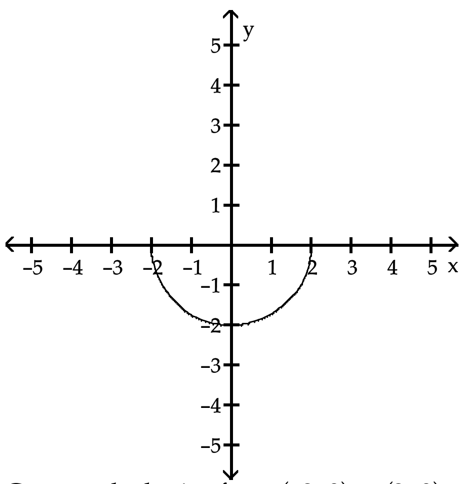
Clockwise from (2, 0) to (–2, 0)

B) $x^2 + y^2 = 4$



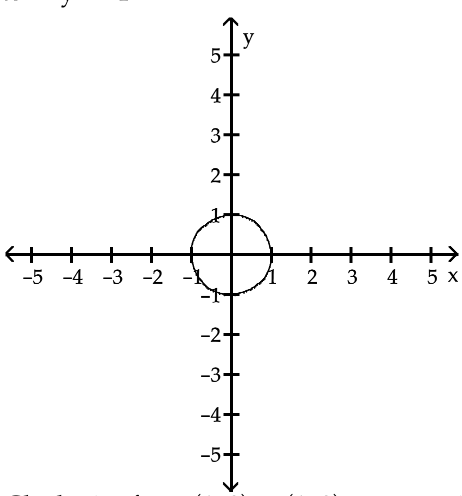
Counterclockwise from (2, 0) to (2, 0), one rotation

C) $x^2 + y^2 = 4$



Counterclockwise from (–2, 0) to (2, 0)

D) $x^2 + y^2 = 1$



Clockwise from (1, 0) to (1, 0), one rotation

You want a linearization that will replace the function over an interval that includes the point x_0. To make your subsequent work as simple as possible, you want to center the linearization not at x_0 but at a nearby integer $x = a$ at which the function and its derivative are easy to evaluate. What linearization do you use?

388) $f(x) = \sqrt{x}$, $x_0 = 16.1$ 388)

A) $2 + \frac{1}{8}x$ B) $2 - \frac{1}{8}x$ C) $2 + \frac{1}{4}x$ D) $\frac{1}{2} + \frac{1}{2}x$

Find the linearization L(x) of f(x) at x = a.

389) $f(x) = \tan x$, $a = \pi$ 389)

A) $L(x) = 2x - \pi$ B) $L(x) = x - 2\pi$ C) $L(x) = x + \pi$ D) $L(x) = x - \pi$

The function f(x) changes value when x changes from x_0 to $x_0 + dx$. Find the approximation error $|\triangle f - df|$. Round your answer, if appropriate.

390) $f(x) = \frac{1}{x}$, $x_0 = 2$, $dx = 0.3$ 390)

A) 0.14022 B) 0.2587 C) 0.00978 D) 0.51957

Find the derivative of the function.

391) $y = \frac{x^2 + 2x - 2}{x^2 - 2x + 2}$ 391)

A) $y' = \frac{4x^2 + 8x}{(x^2 - 2x + 2)^2}$ B) $y' = \frac{-4x^2 - 8x}{(x^2 - 2x + 2)^2}$

C) $y' = \frac{-4x^2 + 8x}{(x^2 - 2x + 2)^2}$ D) $y' = \frac{4x^2 - 8x}{(x^2 - 2x + 2)^2}$

Find dy.

392) $y = x\sqrt{9x + 4}$ 392)

A) $\frac{27x + 8}{\sqrt{9x + 4}}\,dx$ B) $\frac{27x + 8}{2\sqrt{9x + 4}}\,dx$ C) $\frac{27x - 8}{2\sqrt{9x + 4}}\,dx$ D) $\frac{27x - 8}{\sqrt{9x + 4}}\,dx$

Find the derivative.

393) $y = \frac{6}{\sin x} + \frac{1}{\cot x}$ 393)

A) $y' = -6 \csc x \cot x + \sec^2 x$ B) $y' = 6 \csc x \cot x - \sec^2 x$

C) $y' = 6 \csc x \cot x - \csc^2 x$ D) $y' = 6 \cos x - \csc^2 x$

Solve the problem.

394) A charged particle of mass m and charge q moving in an electric field E has an acceleration a given by 394)

$$a = \frac{qE}{m},$$

where q and E are constants. Find $\frac{da}{dm}$.

A) $\frac{da}{dm} = qEm$ B) $\frac{da}{dm} = -\frac{qE}{m^2}$ C) $\frac{da}{dm} = \frac{qE}{m^2}$ D) $\frac{da}{dm} = -\frac{m}{qE}$

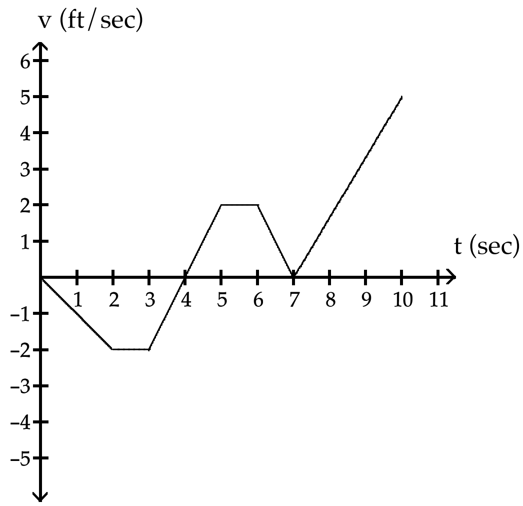
Find the value of d^2y/dx^2 at the point defined by the given value of t.

395) $x = 3 \sin t$, $y = 3 \cos t$, $t = \frac{3\pi}{4}$ 395)

A) $\frac{\sqrt{2}}{3}$ B) $2\sqrt{2}$ C) -2 D) $-\frac{2\sqrt{2}}{3}$

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

396) 396)



What is the body's speed when t = 10 sec?

A) –5 ft/sec B) 3 ft/sec C) 5 ft/sec D) 0 ft/sec

Find the derivative of the function.

397) $y = \sqrt[9]{x^5}$ 397)

A) $\frac{dy}{dx} = \frac{9}{5}x^{4/9}$ B) $\frac{dy}{dx} = \frac{9}{5}x^{-4/9}$ C) $\frac{dy}{dx} = \frac{5}{9}x^{4/9}$ D) $\frac{dy}{dx} = \frac{5}{9}x^{-4/9}$

Write the function in the form y = f(u) and u = g(x). Then find dy/dx as a function of x.

398) $y = \cot(6x - 10)$ 398)

A) $y = \cot u$; $u = 6x - 10$; $\frac{dy}{dx} = -6 \cot(6x - 10) \csc(6x - 10)$

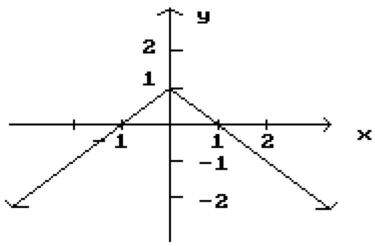
B) $y = \cot u$; $u = 6x - 10$; $\frac{dy}{dx} = -\csc^2(6x - 10)$

C) $y = 6u - 10$; $u = \cot x$; $\frac{dy}{dx} = -6 \cot x \csc^2 x$

D) $y = \cot u$; $u = 6x - 10$; $\frac{dy}{dx} = -6 \csc^2(6x - 10)$

Given the graph of f, find any values of x at which f' is not defined.

399) 399)



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

Solve the problem. Round your answer, if appropriate.

400) The volume of a sphere is increasing at a rate of $8\ \text{cm}^3/\text{sec}$. Find the rate of change of its surface area when its volume is $\frac{4\pi}{3}\ \text{cm}^3$. (Do not round your answer.) 400)

A) $16\ \text{cm}^2/\text{sec}$ B) $16\pi\ \text{cm}^2/\text{sec}$ C) $\frac{1}{3}\ \text{cm}^2/\text{sec}$ D) $\frac{32}{3}\ \text{cm}^2/\text{sec}$

Find the value of $(f \circ g)'$ at the given value of x.

401) $f(u) = \frac{u - 1}{u + 1}$, $u = g(x) = \sqrt{x}$, $x = 9$ 401)

A) $\frac{1}{48}$ B) $\frac{1}{3}$ C) $\frac{1}{9}$ D) $\frac{1}{16}$

Suppose that the functions f and g and their derivatives with respect to x have the following values at the given values of x. Find the derivative with respect to x of the given combination at the given value of x.

402) 402)

x	f(x)	g(x)	$f'(x)$	$g'(x)$
3	1	4	6	7
4	–3	3	5	–5

$f(g(x))$, $x = 4$

A) 18 B) –25 C) 6 D) –30

Write the function in the form y = f(u) and u = g(x). Then find dy/dx as a function of x.

403) $y = \cos^3 x$ 403)

A) $y = \cos u$; $u = x^3$; $\frac{dy}{dx} = -3x^2 \sin(x^3)$ B) $y = \cos u$; $u = x^3$; $\frac{dy}{dx} = -\sin(x^3)$

C) $y = u^3$; $u = \cos x$; $\frac{dy}{dx} = -3\cos^2 x \sin x$ D) $y = u^3$; $u = \cos x$; $\frac{dy}{dx} = 3\cos^2 x \sin x$

Solve the problem.

404) The volume of a square pyramid is related to the length of a side of the base s and the height h by the formula $V = \frac{1}{3}s^2 h$. How is dV/dt related to ds/dt if h is constant? 404)

A) $\frac{dV}{dt} = \frac{2hs}{3}\frac{ds}{dt}$ B) $\frac{dV}{dt} = \frac{2s}{3}\frac{ds}{dt}$ C) $\frac{dV}{dt} = \frac{h}{3}\frac{ds}{dt}$ D) $\frac{dV}{dt} = \frac{s^2}{3}\frac{ds}{dt}$

Find the derivative of the function.

405) $y = \dfrac{x^2 - 3x + 2}{x^7 - 2}$ 405)

A) $y' = \dfrac{-5x^8 + 19x^7 - 14x^6 - 4x + 6}{(x^7 - 2)^2}$

B) $y' = \dfrac{-5x^8 + 18x^7 - 13x^6 - 4x + 6}{(x^7 - 2)^2}$

C) $y' = \dfrac{-5x^8 + 18x^7 - 14x^6 - 3x + 6}{(x^7 - 2)^2}$

D) $y' = \dfrac{-5x^8 + 18x^7 - 14x^6 - 4x + 6}{(x^7 - 2)^2}$

Given y = f(u) and u = g(x), find dy/dx = f′(g(x))g′(x).

406) $y = \csc u,\ u = x^7 + 2x$ 406)

A) $-(7x^6 + 2) \csc x \cot x$

B) $- \csc (x^7 + 2x) \cot (x^7 + 2x)$

C) $-(7x^6 + 2) \cot^2(x^7 + 2x)$

D) $-(7x^6 + 2) \csc (x^7 + 2x) \cot (x^7 + 2x)$

Find the derivative.

407) $p = \dfrac{\sec q + \csc q}{\csc q}$ 407)

A) $\dfrac{dp}{dq} = \sec q \tan q$

B) $\dfrac{dp}{dq} = - \csc q \cot q$

C) $\dfrac{dp}{dq} = \sec^2 q + 1$

D) $\dfrac{dp}{dq} = \sec^2 q$

Solve the problem.

408) Suppose that the revenue from selling x radios is $r(x) = 70x - \dfrac{x^2}{10}$ dollars. Use the function $r'(x)$ to estimate the increase in revenue that will result from increasing production from 100 radios to 101 radios per week. 408)

A) $50.00

B) $90.00

C) $49.80

D) $60.00

Find an equation for the line tangent to the curve at the point defined by the given value of t.

409) $x = 4 \sin t,\ y = 4 \cos t,\ t = \dfrac{3\pi}{4}$ 409)

A) $y = 4\sqrt{2}x + 1$

B) $y = x - 4\sqrt{2}$

C) $y = - x + 4\sqrt{2}$

D) $y = 4x + 4\sqrt{2}$

Given y = f(u) and u = g(x), find dy/dx = f′(g(x))g′(x).

410) $y = \dfrac{3}{u^2},\ u = 7x - 5$ 410)

A) $-\dfrac{21}{7x - 5}$

B) $-\dfrac{42}{7x - 5}$

C) $\dfrac{42x}{7x - 5}$

D) $-\dfrac{42}{(7x - 5)^3}$

Solve the problem.

411) Find the points on the curve $x^2 - xy + y^2 = 12$ where the tangent is parallel to the y-axis. 411)

A) (−2, −4), (2, 4)

B) (−4, −2), (4, 2)

C) (−4, −2), (−2, 2), (2, −2), (4, 2)

D) (−2, −4), (−2, 2), (2, −2), (2, 4)

Find the second derivative.

412) $s = \dfrac{11t^3}{3} + 11$ 412)

A) $22t + 11$ B) $22t$ C) $11t$ D) $11t^2$

Find the linearization L(x) of f(x) at x = a.

413) $f(x) = \dfrac{x}{7x + 7}$, $a = 0$ 413)

A) $L(x) = \dfrac{1}{49}x$ B) $L(x) = -\dfrac{1}{49}x$ C) $L(x) = -\dfrac{1}{7}x$ D) $L(x) = \dfrac{1}{7}x$

Solve the problem.

414) Water is falling on a surface, wetting a circular area that is expanding at a rate of 8 mm^2/s. How fast is the radius of the wetted area expanding when the radius is 171 mm? (Round your answer to four decimal places.) 414)

A) 0.0468 mm/s B) 0.0149 mm/s C) 134.3030 mm/s D) 0.0074 mm/s

Find the derivative of the function.

415) $h(\theta) = \sqrt{9 + \sin(12\theta)}$ 415)

A) $h'(\theta) = \dfrac{1}{2\sqrt{9 + \sin(12\theta)}}$ B) $h'(\theta) = \dfrac{\cos(12\theta)}{2\sqrt{9 + \sin(12\theta)}}$

C) $h'(\theta) = \dfrac{6\cos(12\theta)}{\sqrt{9 + \sin(12\theta)}}$ D) $h'(\theta) = \dfrac{\cos(12\theta)}{(9 + \sin(12\theta))^{3/2}}$

Solve the problem.

416) The position of a body moving on a coordinate line is given by $s = t^2 - 6t + 10$, with s in meters and t in seconds. When, if ever, during the interval $0 \le t \le 6$ does the body change direction? 416)

A) At t = 6 sec B) At t = 3 sec

C) At t = 12 sec D) No change in direction

417) A wheel with radius 2 m rolls at 18 rad/s. How fast is a point on the rim of the wheel rising when the point is $\pi/3$ radians above the horizontal (and rising)? (Round your answer to one decimal place.) 417)

A) 72.0 m/s B) 9.0 m/s C) 18.0 m/s D) 36.0 m/s

Suppose u and v are differentiable functions of x. Use the given values of the functions and their derivatives to find the value of the indicated derivative.

418) $u(2) = 7$, $u'(2) = 3$, $v(2) = -1$, $v'(2) = -4$. 418)

$\dfrac{d}{dx}(uv)$ at $x = 2$

A) −25 B) 25 C) 31 D) −31

Find the derivative of the function.

419) $q = \sqrt{18r - r^5}$ 419)

A) $\frac{dq}{dr} = \frac{-5r^4}{\sqrt{18r - r^5}}$

B) $\frac{dq}{dr} = \frac{1}{2\sqrt{18r - r^5}}$

C) $\frac{dq}{dr} = \frac{18 - 5r^4}{2\sqrt{18r - r^5}}$

D) $\frac{dq}{dr} = \frac{1}{2\sqrt{18 - 5r^4}}$

Find the indicated derivative.

420) Find y''' if $y = 6x \sin x$. 420)

A) $y''' = 12 \cos x - 6x \sin x$

B) $y''' = -6x \cos x + 18 \sin x$

C) $y''' = 6x \cos x + 18 \sin x$

D) $y''' = -6x \cos x - 18 \sin x$

Find the derivative.

421) $s = 2t^2 + 5t + 3$ 421)

A) $2t^2 + 5$ B) $4t + 5$ C) $2t + 5$ D) $4t^2 + 5$

The equation gives the position s = f(t) of a body moving on a coordinate line (s in meters, t in seconds).

422) $s = 5 + 3 \cos t$ 422)

Find the body's speed at time $t = \pi/3$ sec.

A) $\frac{3\sqrt{3}}{2}$ m/sec B) $\frac{3}{2}$ m/sec C) $-\frac{3\sqrt{3}}{2}$ m/sec D) $-\frac{3}{2}$ m/sec

Find the second derivative of the function.

423) $p = \left(\frac{q + 2}{q}\right)\left(\frac{q + 6}{q^2}\right)$ 423)

A) $\frac{d^2p}{dq^2} = \frac{2}{q} + \frac{48}{q^2} + \frac{144}{q^3}$

B) $\frac{d^2p}{dq^2} = -\frac{1}{q^2} - \frac{16}{q^3} - \frac{36}{q^4}$

C) $\frac{d^2p}{dq^2} = -\frac{2}{q^3} - \frac{48}{q^4} - \frac{144}{q^5}$

D) $\frac{d^2p}{dq^2} = \frac{2}{q^3} + \frac{48}{q^4} + \frac{144}{q^5}$

Solve the problem.

424) The area of the base B and the height h of a pyramid are related to the pyramid's volume V by the formula $V = \frac{1}{3}Bh$. How is dV/dt related to dh/dt if B is constant? 424)

A) $\frac{dV}{dt} = B\frac{dh}{dt}$ B) $\frac{dV}{dt} = \frac{dh}{dt}$ C) $\frac{dV}{dt} = \frac{B}{3}\frac{dh}{dt}$ D) $\frac{dV}{dt} = \frac{1}{3}\frac{dh}{dt}$

Find y'.

425) $y = \left(x + \frac{1}{x}\right)\left(x - \frac{1}{x}\right)$ 425)

A) $2x - \frac{1}{x^2}$ B) $2x + \frac{1}{x^2}$ C) $2x + \frac{1}{x^3}$ D) $2x + \frac{2}{x^3}$

Solve the problem. Round your answer, if appropriate.

426) Water is being drained from a container which has the shape of an inverted right circular cone. The container has a radius of 9.00 inches at the top and a height of 10.0 inches. At the instant when the water in the container is 6.00 inches deep, the surface level is falling at a rate of 0.9 in./sec. Find the rate at which water is being drained from the container. 426)

A) 82.4 $in.^3/s$ B) 88.6 $in.^3/s$ C) 78.7 $in.^3/s$ D) 66.2 $in.^3s$

Suppose u and v are differentiable functions of x. Use the given values of the functions and their derivatives to find the value of the indicated derivative.

427) $u(1) = 5$, $u'(1) = -7$, $v(1) = 6$, $v'(1) = -3$. 427)

$\frac{d}{dx}\left(\frac{u}{v}\right)$ at $x = 1$

A) $-\frac{3}{4}$ B) -3 C) $-\frac{9}{2}$ D) $-\frac{19}{12}$

Calculate the derivative of the function. Then find the value of the derivative as specified.

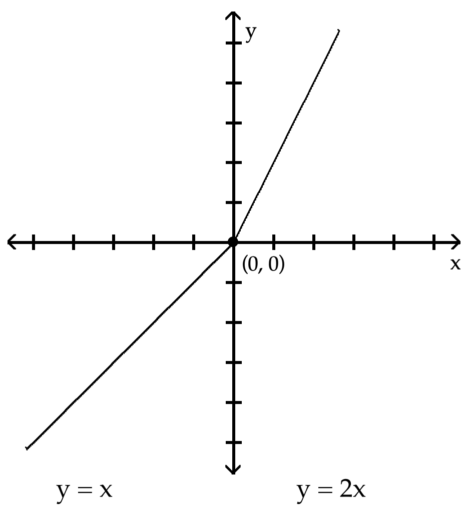
428) $f(x) = x^2 + 7x - 2$; $f'(0)$ 428)

A) $f'(x) = 2x + 7$; $f'(0) = 7$ B) $f'(x) = 2x - 2$; $f'(0) = -2$

C) $f'(x) = x + 7$; $f'(0) = 7$ D) $f'(x) = 2x$; $f'(0) = 0$

Compare the right–hand and left–hand derivatives to determine whether or not the function is differentiable at the point whose coordinates are given.

429) 429)



A) Since $\lim_{x\to0^+} f'(x) = -2$ while $\lim_{x\to0^-} f'(x) = -1$, f(x) is not differentiable at x = 0.

B) Since $\lim_{x\to0^+} f'(x) = 2$ while $\lim_{x\to0^-} f'(x) = 1$, f(x) is not differentiable at x = 0.

C) Since $\lim_{x\to0^+} f'(x) = 1$ while $\lim_{x\to0^-} f'(x) = 2$, f(x) is not differentiable at x = 0.

D) Since $\lim_{x\to0^+} f'(x) = 1$ while $\lim_{x\to0^-} f'(x) = 1$, f(x) is differentiable at x = 0.

1) B
ID: TCALC11W 3.1.4-2
Diff: 0 Page Ref: 147-155
Objective: (3.1) Match Graph of Function with Graph of Derivative

2) D
ID: TCALC11W 3.1.4-3
Diff: 0 Page Ref: 147-155
Objective: (3.1) Match Graph of Function with Graph of Derivative

3) D
ID: TCALC11W 3.1.4-5
Diff: 0 Page Ref: 147-155
Objective: (3.1) Match Graph of Function with Graph of Derivative

4) B
ID: TCALC11W 3.1.4-1
Diff: 0 Page Ref: 147-155
Objective: (3.1) Match Graph of Function with Graph of Derivative

5) C
ID: TCALC11W 3.1.4-4
Diff: 0 Page Ref: 147-155
Objective: (3.1) Match Graph of Function with Graph of Derivative

6) A
ID: TCALC11W 3.1.4-6
Diff: 0 Page Ref: 147-155
Objective: (3.1) Match Graph of Function with Graph of Derivative

7) $5\sqrt{2}$
ID: TCALC11W 3.5.12-1
Diff: 0 Page Ref: 190-201
Objective: (3.5) *Know Concepts: The Chain Rule

8) (a) $Q(x) = \frac{1}{3} - \frac{x}{9} + \frac{x^2}{27}$

(b) I expect the quadratic approximation to be more accurate than the linearization. The linearization accounts for how the value of f(x) is changing at the point x = a, but the quadratic approximation also accounts for the change in this change by incorporating the second derivative into the approximation.
ID: TCALC11W 3.8.8-1
Diff: 0 Page Ref: 221-231
Objective: (3.8) *Know Concepts: Linearization and Differentials

9) The derivative of a product is not the product of the derivatives. The correct derivative is $\frac{d}{dx}(x^8) = 8x^7$.

ID: TCALC11W 3.2.10-8
Diff: 0 Page Ref: 159-168
Objective: (3.2) *Know Concepts: Differentiation Rules

10) $\frac{d}{dx}(x^{9/2}) = \frac{d}{dx}(x^4 \cdot x^{1/2}) = x^4 \cdot \frac{1}{2\sqrt{x}} + x^{1/2} \cdot 4x^3 = \frac{1}{2}x^{7/2} + 4x^{7/2} = \frac{9}{2}x^{7/2}$

ID: TCALC11W 3.2.10-3
Diff: 0 Page Ref: 159-168
Objective: (3.2) *Know Concepts: Differentiation Rules

11) Yes, a tangent line to a graph can intersect the graph at more than one point. For example, the graph $y = x^3 - 2x^2$ has a horizontal tangent at $x = 0$. It intersects the graph at both (0, 0) and (2, 0).
ID: TCALC11W 3.1.9-7
Diff: 0 Page Ref: 147-155
Objective: (3.1) *Know Concepts: The Derivative as a Function

12) The tangents are perpendicular. For the curve $xy = 1$, $\frac{dy}{dx} = -\frac{y}{x}$. For the curve $x^2 - y^2 = 1$, $\frac{dy}{dx} = \frac{x}{y}$. The two derivatives are negative reciprocals, and thus the tangents are perpendicular.
ID: TCALC11W 3.6.7-6
Diff: 0 Page Ref: 205-211
Objective: (3.6) *Know Concepts: Implicit Differentiation

13) Answers will vary. Possible answer: $x = -4 - 2t$, $y = 3 - 9t$, $0 \le t \le 1$
ID: TCALC11W 3.5.8-1
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Parametrization for Curve

14) $y = -4\pi x + 2\pi + 4$; -2π
ID: TCALC11W 3.5.12-3
Diff: 0 Page Ref: 190-201
Objective: (3.5) *Know Concepts: The Chain Rule

15) $g'(4) = 10$
ID: TCALC11W 3.1.9-8
Diff: 0 Page Ref: 147-155
Objective: (3.1) *Know Concepts: The Derivative as a Function

16) $y' = 4x^2 + 7x - 3$, $y'' = 8x + 7$, $y''' = 8$, $y^{(n)} = 0$ for $n \ge 4$
ID: TCALC11W 3.2.5-1
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivatives of All Orders

17) By the Quotient Rule, $\frac{dy}{dx} = \frac{x^4(3x^2 + 6x) - (x^3 + 3x^2)4x^3}{x^8} = \frac{-x^6 - 6x^5}{x^8} = -\frac{1}{x^2} - \frac{6}{x^3}$.

By the Power Rule (after simplification), $\frac{dy}{dx} = \frac{d}{dx}(x^{-1} + 3x^{-2}) = -x^{-2} - 6x^{-3} = -\frac{1}{x^2} - \frac{6}{x^3}$.

$-\frac{1}{x^2} - \frac{6}{x^3} = -\frac{1}{x^2} - \frac{6}{x^3}$
ID: TCALC11W 3.2.10-4
Diff: 0 Page Ref: 159-168
Objective: (3.2) *Know Concepts: Differentiation Rules

18) $-\sin x$
ID: TCALC11W 3.4.6-3
Diff: 0 Page Ref: 183-188
Objective: (3.4) *Know Concepts: Derivatives of Trigonometric Functions

19) (1) $(x - 3)^2 + y^2 = 9$

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

$y = \pm\sqrt{6x - x^2}$

$\dfrac{dy}{dx} = \pm\dfrac{3 - x}{\sqrt{6x - x^2}}$

(2) $2(x - 3) + 2y\dfrac{dy}{dx} = 0$

$2y\dfrac{dy}{dx} = -2(x - 3) = 2(3 - x)$

$\dfrac{dy}{dx} = \dfrac{3 - x}{y}$

Substituting $y = \pm\sqrt{6x - x^2}$ yields $\dfrac{dy}{dx} = \pm\dfrac{3 - x}{\sqrt{6x - x^2}}$.

ID: TCALC11W 3.6.7-5
Diff: 0 Page Ref: 205-211
Objective: (3.6) *Know Concepts: Implicit Differentiation

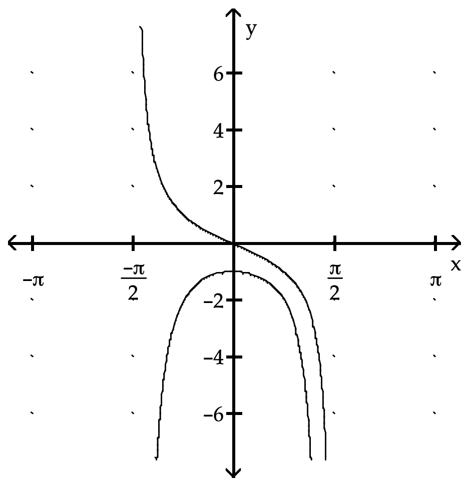
20) The values of $g'(1)$ and $f'(g(1))$ must have the same sign, since $(f \circ g)'(1) = f'(g(1))g'(1) > 0$.
ID: TCALC11W 3.5.12-5
Diff: 0 Page Ref: 190-201
Objective: (3.5) *Know Concepts: The Chain Rule

21) $\tan x = \dfrac{\sin x}{\cos x} = \sin x \sec x$

$\dfrac{d}{dx}(\tan x) = \dfrac{d}{dx}(\sin x \sec x) = \sin x \sec x \tan x + \sec x \cos x = \dfrac{\sin x}{\cos x} \cdot \tan x + 1 = \tan^2 x + 1 = \sec^2 x$

ID: TCALC11W 3.4.6-8
Diff: 0 Page Ref: 183-188
Objective: (3.4) *Know Concepts: Derivatives of Trigonometric Functions

22)



No, the slope of the graph of $y = -\tan x$ is never positive. The slope at any point is equal to the derivative, which is $y' = -\sec^2 x$. Since $\sec^2 x$ is never negative, $y' = -\sec^2 x$ is never positive, and the slope of the graph is never positive.
ID: TCALC11W 3.4.6-7
Diff: 0 Page Ref: 183-188
Objective: (3.4) *Know Concepts: Derivatives of Trigonometric Functions

23) The function $y = \frac{x^5}{5}$ decreases (as x increases) over no intervals of x-values. Its derivative $y' = x^4$ is negative for no values of x. The function decreases (as x increases) wherever its derivative is negative.
ID: TCALC11W 3.1.9-3
Diff: 0 Page Ref: 147-155
Objective: (3.1) *Know Concepts: The Derivative as a Function

24) Answers will vary. Possible answer: $x = y^2 + 2$, $y = t$, $t \geq 0$
ID: TCALC11W 3.5.8-2
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Parametrization for Curve

25) 7
ID: TCALC11W 3.5.12-2
Diff: 0 Page Ref: 190-201
Objective: (3.5) *Know Concepts: The Chain Rule

26) $\frac{dr}{du} = \frac{dr}{ds} \cdot \frac{ds}{dt} \cdot \frac{dt}{du}$
ID: TCALC11W 3.5.12-8
Diff: 0 Page Ref: 190-201
Objective: (3.5) *Know Concepts: The Chain Rule

27) By implicit differentation, we find that $\frac{dy}{dx} = \frac{1 - x}{y - 1}$. When the tangent is horizontal, $\frac{dy}{dx} = \frac{1 - x}{y - 1} = 0$, and thus $x = 1$.

Substituting $x = 1$ into the equation for the curve yields $y^2 - 2y + 2 = 0$. Since there are no real solutions to this equation, there are no points on the curve where $x = 1$. Therefore, the curve has no horizontal tangents.
ID: TCALC11W 3.6.7-4
Diff: 0 Page Ref: 205-211
Objective: (3.6) *Know Concepts: Implicit Differentiation

28) By the Product Rule, $\frac{dy}{dx} = 3(3x^2 - 8x) + 0(x^3 - 4x^2) = 9x^2 - 24x$.

By the Constant Multiple Rule, $\frac{dy}{dx} = 3(3x^2 - 8x) = 9x^2 - 24x$.

$9x^2 - 24x = 9x^2 - 24x$

ID: TCALC11W 3.2.10-6
Diff: 0 Page Ref: 159-168
Objective: (3.2) *Know Concepts: Differentiation Rules

29) c = 16
ID: TCALC11W 3.4.6-1
Diff: 0 Page Ref: 183-188
Objective: (3.4) *Know Concepts: Derivatives of Trigonometric Functions

30) The curve $y = \sqrt{x}$ never has a negative slope. The derivative of the curve is $y' = \frac{1}{2\sqrt{x}}$, which is never negative. A curve only has a negative slope where its derivative is negative. Since the derivative of $y = \sqrt{x}$ is never negative, the curve never has a negative slope.
ID: TCALC11W 3.1.9-4
Diff: 0 Page Ref: 147-155
Objective: (3.1) *Know Concepts: The Derivative as a Function

31) Answers ii and iii could both be true.
ID: TCALC11W 3.6.7-1
Diff: 0 Page Ref: 205-211
Objective: (3.6) *Know Concepts: Implicit Differentiation

32) $dy = nax^{n-1}\,dx$, therefore $\frac{dy}{y} = \frac{nax^{n-1}\,dx}{ax^n} = n\frac{dx}{x}$.

Therefore, $\left|\frac{dy}{y}\right| = |n|\left|\frac{dx}{x}\right|$. Thus, the relative uncertainty in the dependent variable y is always $|n|$ times the relative uncertainty in the independent variable x.
ID: TCALC11W 3.8.8-2
Diff: 0 Page Ref: 221-231
Objective: (3.8) *Know Concepts: Linearization and Differentials

33) According to the chain rule, $(f \circ g)'(x) = f'(g(x))g'(x)$, not $f'(x))g'(x)$. Thus, $\frac{d}{dx}(x^2 - 3x)^4 = 4(g(x))^3g'(x) = 4(x^2 - 3x)^3(2x - 3)$. In other words, $f'(u) = 4u^3$ must be evaluated at $u = x^2 - 3x$, not at $u = x$.
ID: TCALC11W 3.5.12-7
Diff: 0 Page Ref: 190-201
Objective: (3.5) *Know Concepts: The Chain Rule

34) The function $y = 2x^2$ increases (as x increases) over the interval $0 < x < \infty$. Its derivative $y' = 4x$ is positive for $x > 0$. The function increases (as x increases) wherever its derivative is positive.
ID: TCALC11W 3.1.9-2
Diff: 0 Page Ref: 147-155
Objective: (3.1) *Know Concepts: The Derivative as a Function

35) By the Quotient Rule, $\frac{d}{dx}\left(\frac{x^3-2}{x}\right)=\frac{x\cdot(3x^2)-(x^3-2)\cdot 1}{x^2}=\frac{2x^3+2}{x^2}$.

By the Product Rule, $\frac{d}{dx}\left(\frac{x^3-2}{x}\right)=\frac{d}{dx}((x^3-2)\,x^{-1})=(x^3-2)(-x^{-2})+\ x^{-1}(3x^2)=2x+2x^{-2}=\frac{2x^3+2}{x^2}$.

$\frac{2x^3+2}{x^2}=\frac{2x^3+2}{x^2}$

ID: TCALC11W 3.2.10-2
Diff: 0 Page Ref: 159-168
Objective: (3.2) *Know Concepts: Differentiation Rules

36) By the Quotient Rule, $\frac{dy}{dx}=\frac{x^3\cdot 0-5\cdot 3x^2}{x^6}=\frac{-15x^2}{x^6}=-\frac{15}{x^4}$.

By the Power Rule, $\frac{dy}{dx}=\frac{d}{dx}(5x^{-3})=-15x^{-4}=-\frac{15}{x^4}$.

$-\frac{15}{x^4}=-\frac{15}{x^4}$

ID: TCALC11W 3.2.10-7
Diff: 0 Page Ref: 159-168
Objective: (3.2) *Know Concepts: Differentiation Rules

37) Answers i and ii could both be true.
ID: TCALC11W 3.6.7-2
Diff: 0 Page Ref: 205-211
Objective: (3.6) *Know Concepts: Implicit Differentiation

38) $[5, \infty)$
ID: TCALC11W 3.1.9-1
Diff: 0 Page Ref: 147-155
Objective: (3.1) *Know Concepts: The Derivative as a Function

39) Answers will vary. Possible answer: $x=-6-9t,\ y=2-4t,\ t\geq 0$
ID: TCALC11W 3.5.8-3
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Parametrization for Curve

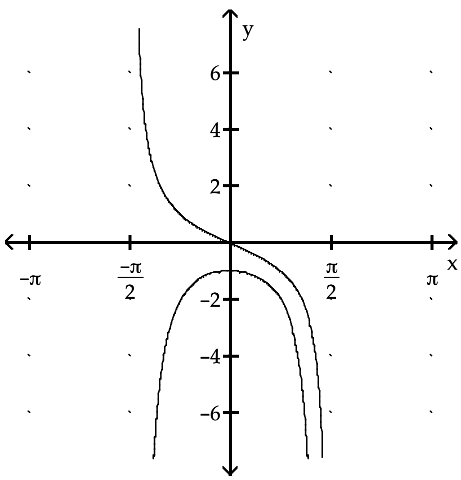
40) cos x
ID: TCALC11W 3.4.6-4
Diff: 0 Page Ref: 183-188
Objective: (3.4) *Know Concepts: Derivatives of Trigonometric Functions

41) There is no difference at all. At $x = a$, the slope of the tangent $= \lim\limits_{x\to a}\frac{f(x)-f(a)}{x-a}=f'(x)$.

ID: TCALC11W 3.1.9-10
Diff: 0 Page Ref: 147-155
Objective: (3.1) *Know Concepts: The Derivative as a Function

42) Neither the tangent to the graph of g at x = 2 nor the tangent to the graph of f at u = g(2) can be horizontal. Since $y = f(g(x))$ at $x = 2$ is not horizontal, $y'(2) = f'(g(2)) \cdot g'(2) \neq 0$. That means that neither multiplier can be = 0. Since $f'(g(2)) \neq 0$, the tangent to the graph of f at u = g(2) cannot be horizontal. Since $g'(2) \neq 0$, the tangent to the graph of g at x = 2 cannot be horizontal.
ID: TCALC11W 3.5.12-6
Diff: 0 Page Ref: 190-201
Objective: (3.5) *Know Concepts: The Chain Rule

43)



No, the graph of y = -tan x does not appear to have a smallest slope. The slope of the graph of y = - tan x decreases without bound as x approaches π/2 or -π/2.
ID: TCALC11W 3.4.6-6
Diff: 0 Page Ref: 183-188
Objective: (3.4) *Know Concepts: Derivatives of Trigonometric Functions

44) $\varepsilon \approx \frac{1}{3}$. The slopes of g(x) and its linear approximation are deviating from each other more slowly than the slopes of the corresponding curves for f(x) as long as $|g''(x)| < |f''(x)|$. Since $f''(x) = 2$ and $g''(x) = 6x$, then $|g''(x)| < |f''(x)| \rightarrow |6x| < 2$ or $x < \left|\frac{1}{3}\right|$ or $-\frac{1}{3} \leq x \leq \frac{1}{3}$. Thus, $\varepsilon \approx \frac{1}{3}$.
ID: TCALC11W 3.8.8-3
Diff: 0 Page Ref: 221-231
Objective: (3.8) *Know Concepts: Linearization and Differentials

45) The curve has no tangent whose slope is -2. The derivative of the curve, $y' = 3x^2 + 4$, is always positive and thus never equals -2.
ID: TCALC11W 3.1.9-6
Diff: 0 Page Ref: 147-155
Objective: (3.1) *Know Concepts: The Derivative as a Function

46) $y = 2x$ and $y = -\frac{1}{2}x$; The tangents are perpendicular.
ID: TCALC11W 3.5.12-4
Diff: 0 Page Ref: 190-201
Objective: (3.5) *Know Concepts: The Chain Rule

47) $\frac{d}{dx}\left(\frac{u}{c}\right) = \frac{c \cdot u' - u \cdot 0}{c^2} = \frac{c \cdot u'}{c^2} = \frac{u'}{c} = \frac{1}{c}u'$. Note that you would arrive at the same answer by using the Constant Multiple Rule, since $\frac{d}{dx}\left(\frac{1}{c}u\right) = \frac{1}{c}\left(\frac{du}{dx}\right) = \frac{1}{c}u'$.
ID: TCALC11W 3.2.10-10
Diff: 0 Page Ref: 159-168
Objective: (3.2) *Know Concepts: Differentiation Rules

48) mn
ID: TCALC11W 3.5.12-9
Diff: 0 Page Ref: 190-201
Objective: (3.5) *Know Concepts: The Chain Rule

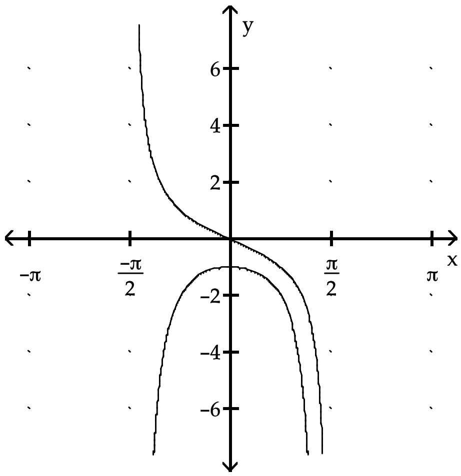
49) $y' = \frac{x^6}{1440}$, $y'' = \frac{x^5}{240}$, $y''' = \frac{x^4}{48}$, $y^{(4)} = \frac{x^3}{12}$, $y^{(5)} = \frac{x^2}{4}$, $y^{(6)} = \frac{x}{2}$, $y^{(7)} = \frac{1}{2}$, $y^{(n)} = 0$ for $n \ge 8$
ID: TCALC11W 3.2.5-2
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivatives of All Orders

50) $y = |x| = \sqrt{x^2}$
$y' = \frac{1}{2}\frac{1}{\sqrt{x^2}}(2x) = \frac{x}{\sqrt{x^2}} = \frac{x}{|x|}$
ID: TCALC11W 3.5.12-10
Diff: 0 Page Ref: 190-201
Objective: (3.5) *Know Concepts: The Chain Rule

51) The curve $y = (x + 3)^3$ has a horizontal tangent at $x = -3$. The derivative of the curve is $y' = 3(x + 3)^2$, which equals zero at $x = -3$. A curve has a horizontal tangent wherever its derivative equals zero.
ID: TCALC11W 3.1.9-5
Diff: 0 Page Ref: 147-155
Objective: (3.1) *Know Concepts: The Derivative as a Function

52) By the Quotient Rule, $\frac{d}{dx}\left(\frac{1}{x^2}\right) = \frac{x^2 \cdot 0 - 1 \cdot 2x}{x^4} = -\frac{2x}{x^4} = -\frac{2}{x^3}$.
By the Power Rule, $\frac{d}{dx}\left(\frac{1}{x^2}\right) = \frac{d}{dx}\left(x^{-2}\right) = -2x^{-3} = -\frac{2}{x^3}$.
$-\frac{2}{x^3} = -\frac{2}{x^3}$
ID: TCALC11W 3.2.10-1
Diff: 0 Page Ref: 159-168
Objective: (3.2) *Know Concepts: Differentiation Rules

53)



Yes, the graph of $y = -\tan x$ does appear to have a largest slope. It occurs at $x = 0$, when the slope equals -1.
ID: TCALC11W 3.4.6-5
Diff: 0 Page Ref: 183-188
Objective: (3.4) *Know Concepts: Derivatives of Trigonometric Functions

54) By the Product Rule, $\frac{dy}{dx} = 5x(2x - 3) + 5(x^2 - 3x) = 15x^2 - 30x$.

By the Constant Multiple Rule, $\frac{dy}{dx} = \frac{d}{dx}(5 \cdot (x^3 - 3x^2)) = 5 \cdot (3x^2 - 6x) = 15x^2 - 30x$.

$15x^2 - 30x = 15x^2 - 30x$
ID: TCALC11W 3.2.10-5
Diff: 0 Page Ref: 159-168
Objective: (3.2) *Know Concepts: Differentiation Rules

55) $g'(4) = -5$
ID: TCALC11W 3.1.9-9
Diff: 0 Page Ref: 147-155
Objective: (3.1) *Know Concepts: The Derivative as a Function

56) The derivative of a quotient is not the quotient of the derivatives. The correct derivative is $\frac{d}{dx}(x^{-2}) = -2x^{-3} = -\frac{2}{x^3}$.

ID: TCALC11W 3.2.10-9
Diff: 0 Page Ref: 159-168
Objective: (3.2) *Know Concepts: Differentiation Rules

57) $\frac{dy}{dx} = -\frac{3x^2y + y^2}{x^3 + 2xy}$

$\frac{dx}{dy} = -\frac{x^3 + 2xy}{3x^2y + y^2}$

dy/dx and dx/dy are reciprocals; that is, $\frac{dx}{dy} = \frac{1}{dy/dx}$.

ID: TCALC11W 3.6.7-3
Diff: 0 Page Ref: 205-211
Objective: (3.6) *Know Concepts: Implicit Differentiation

58) – cos x
ID: TCALC11W 3.4.6–2
Diff: 0 Page Ref: 183–188
Objective: (3.4) *Know Concepts: Derivatives of Trigonometric Functions

59) D
ID: TCALC11W 3.6.2–10
Diff: 0 Page Ref: 205–211
Objective: (3.6) Use Implicit Differentiation to Find Derivative

60) B
ID: TCALC11W 3.5.6–7
Diff: 0 Page Ref: 190–201
Objective: (3.5) Apply Chain Rule Given f, g, f ', g '

61) B
ID: TCALC11W 3.3.5–1
Diff: 0 Page Ref: 171–179
Objective: (3.3) Solve Apps: Economics and Other Applications

62) D
ID: TCALC11W 3.8.5–7
Diff: 0 Page Ref: 221–231
Objective: (3.8) Find Approximation Error

63) B
ID: TCALC11W 3.5.10–8
Diff: 0 Page Ref: 190–201
Objective: (3.5) Find Second Derivative Given Parametric Equations

64) C
ID: TCALC11W 3.3.4–3
Diff: 0 Page Ref: 171–179
Objective: (3.3) Identify Function and Its Derivatives from Graph

65) A
ID: TCALC11W 3.5.10–5
Diff: 0 Page Ref: 190–201
Objective: (3.5) Find Second Derivative Given Parametric Equations

66) D
ID: TCALC11W 3.5.1–1
Diff: 0 Page Ref: 190–201
Objective: (3.5) Find dy/dx Given y = f(u) and u = g(x)

67) A
ID: TCALC11W 3.4.4–1
Diff: 0 Page Ref: 183–188
Objective: (3.4) Find Trigonometric Limit

68) D
ID: TCALC11W 3.2.3–6
Diff: 0 Page Ref: 159–168
Objective: (3.2) Find Derivative of Product

69) B
ID: TCALC11W 3.4.5–1
Diff: 0 Page Ref: 183–188
Objective: (3.4) Solve Apps: Simple Harmonic Motion

70) B
ID: TCALC11W 3.3.3–3
Diff: 0 Page Ref: 171–179
Objective: (3.3) Analyze Motion Depicted in Graph

71) A
ID: TCALC11W 3.2.8–4
Diff: 0 Page Ref: 159–168
Objective: (3.2) Find Derivative Given Numerical Values

72) B
ID: TCALC11W 3.6.2–2
Diff: 0 Page Ref: 205–211
Objective: (3.6) Use Implicit Differentiation to Find Derivative

73) D
ID: TCALC11W 3.5.9–3
Diff: 0 Page Ref: 190–201
Objective: (3.5) Find Equation of Tangent Given Parametric Equations

74) B
ID: TCALC11W 3.7.3–10
Diff: 0 Page Ref: 213–217
Objective: (3.7) Solve Apps: Related Rates II

75) B
ID: TCALC11W 3.3.3–8
Diff: 0 Page Ref: 171–179
Objective: (3.3) Analyze Motion Depicted in Graph

76) D
ID: TCALC11W 3.5.2–2
Diff: 0 Page Ref: 190–201
Objective: (3.5) Find $y = f(u)$, $u = g(x)$, dy/dx Given $y = f(x)$

77) D
ID: TCALC11W 3.2.4–2
Diff: 0 Page Ref: 159–168
Objective: (3.2) Find Derivative of Quotient

78) B
ID: TCALC11W 3.2.9–2
Diff: 0 Page Ref: 159–168
Objective: (3.2) Solve Apps: Differentiation Rules

79) D
ID: TCALC11W 3.5.6–5
Diff: 0 Page Ref: 190–201
Objective: (3.5) Apply Chain Rule Given f, g, f', g'

80) C
ID: TCALC11W 3.5.10-7
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Second Derivative Given Parametric Equations

81) C
ID: TCALC11W 3.1.5-7
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Any Values at Which Derivative is Not Defined

82) A
ID: TCALC11W 3.1.6-1
Diff: 0 Page Ref: 147-155
Objective: (3.1) Graph Derivative or Function Given Graph of Other

83) B
ID: TCALC11W 3.2.9-6
Diff: 0 Page Ref: 159-168
Objective: (3.2) Solve Apps: Differentiation Rules

84) A
ID: TCALC11W 3.8.7-6
Diff: 0 Page Ref: 221-231
Objective: (3.8) Solve Apps: Differentials

85) D
ID: TCALC11W 3.4.5-4
Diff: 0 Page Ref: 183-188
Objective: (3.4) Solve Apps: Simple Harmonic Motion

86) C
ID: TCALC11W 3.5.4-1
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Second Derivative Using Chain Rule

87) B
ID: TCALC11W 3.5.5-4
Diff: 0 Page Ref: 190-201
Objective: (3.5) Evaluate Derivative of Composite Function

88) B
ID: TCALC11W 3.6.2-6
Diff: 0 Page Ref: 205-211
Objective: (3.6) Use Implicit Differentiation to Find Derivative

89) D
ID: TCALC11W 3.5.1-5
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find dy/dx Given $y = f(u)$ and $u = g(x)$

90) A
ID: TCALC11W 3.6.3-2
Diff: 0 Page Ref: 205-211
Objective: (3.6) Use Implicit Diff to Find First and Second Derivatives

91) D
ID: TCALC11W 3.6.5–7
Diff: 0 Page Ref: 205–211
Objective: (3.6) Solve Apps: Slopes, Tangents, and Normals

92) D
ID: TCALC11W 3.5.7–2
Diff: 0 Page Ref: 190–201
Objective: (3.5) Find Cartesian Equation and Graph Given Parametric Equations

93) C
ID: TCALC11W 3.1.8–4
Diff: 0 Page Ref: 147–155
Objective: (3.1) Determine if Function Differentiable/Continuous at Point

94) C
ID: TCALC11W 3.2.1–8
Diff: 0 Page Ref: 159–168
Objective: (3.2) Find Derivative of Polynomial

95) D
ID: TCALC11W 3.3.4–6
Diff: 0 Page Ref: 171–179
Objective: (3.3) Identify Function and Its Derivatives from Graph

96) D
ID: TCALC11W 3.4.2–5
Diff: 0 Page Ref: 183–188
Objective: (3.4) Find Higher–Order Derivative of Trigonometric Function

97) B
ID: TCALC11W 3.1.5–3
Diff: 0 Page Ref: 147–155
Objective: (3.1) Find Any Values at Which Derivative is Not Defined

98) B
ID: TCALC11W 3.1.8–3
Diff: 0 Page Ref: 147–155
Objective: (3.1) Determine if Function Differentiable/Continuous at Point

99) A
ID: TCALC11W 3.6.2–5
Diff: 0 Page Ref: 205–211
Objective: (3.6) Use Implicit Differentiation to Find Derivative

100) D
ID: TCALC11W 3.5.9–2
Diff: 0 Page Ref: 190–201
Objective: (3.5) Find Equation of Tangent Given Parametric Equations

101) A
ID: TCALC11W 3.8.1–8
Diff: 0 Page Ref: 221–231
Objective: (3.8) Find Linearization of Function at Point

102) D
ID: TCALC11W 3.2.6-5
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Product/Quotient

103) A
ID: TCALC11W 3.3.3-9
Diff: 0 Page Ref: 171-179
Objective: (3.3) Analyze Motion Depicted in Graph

104) B
ID: TCALC11W 3.6.2-7
Diff: 0 Page Ref: 205-211
Objective: (3.6) Use Implicit Differentiation to Find Derivative

105) D
ID: TCALC11W 3.5.4-5
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Second Derivative Using Chain Rule

106) A
ID: TCALC11W 3.6.1-2
Diff: 0 Page Ref: 205-211
Objective: (3.6) Find Derivative of Rational Power

107) B
ID: TCALC11W 3.2.8-1
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative Given Numerical Values

108) C
ID: TCALC11W 3.6.2-9
Diff: 0 Page Ref: 205-211
Objective: (3.6) Use Implicit Differentiation to Find Derivative

109) C
ID: TCALC11W 3.6.5-2
Diff: 0 Page Ref: 205-211
Objective: (3.6) Solve Apps: Slopes, Tangents, and Normals

110) D
ID: TCALC11W 3.4.1-5
Diff: 0 Page Ref: 183-188
Objective: (3.4) Find Derivative of Trigonometric Function

111) A
ID: TCALC11W 3.5.3-4
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Derivative Using Chain Rule

112) D
ID: TCALC11W 3.6.6-2
Diff: 0 Page Ref: 205-211
Objective: (3.6) Find Slope From Implicitly Defined Parametric Equations

113) D
ID: TCALC11W 3.8.7–3
Diff: 0 Page Ref: 221–231
Objective: (3.8) Solve Apps: Differentials

114) C
ID: TCALC11W 3.3.3–1
Diff: 0 Page Ref: 171–179
Objective: (3.3) Analyze Motion Depicted in Graph

115) C
ID: TCALC11W 3.1.7–3
Diff: 0 Page Ref: 147–155
Objective: (3.1) Compare Right–Hand and Left–Hand Derivatives

116) C
ID: TCALC11W 3.8.4–4
Diff: 0 Page Ref: 221–231
Objective: (3.8) Find Differential

117) C
ID: TCALC11W 3.1.1–7
Diff: 0 Page Ref: 147–155
Objective: (3.1) Find Derivative and Evaluate at Point

118) D
ID: TCALC11W 3.7.1–5
Diff: 0 Page Ref: 213–217
Objective: (3.7) Find Related Rate Equation

119) D
ID: TCALC11W 3.7.3–9
Diff: 0 Page Ref: 213–217
Objective: (3.7) Solve Apps: Related Rates II

120) B
ID: TCALC11W 3.1.3–5
Diff: 0 Page Ref: 147–155
Objective: (3.1) Find Equation of Tangent Line at Point

121) C
ID: TCALC11W 3.2.9–1
Diff: 0 Page Ref: 159–168
Objective: (3.2) Solve Apps: Differentiation Rules

122) A
ID: TCALC11W 3.6.1–6
Diff: 0 Page Ref: 205–211
Objective: (3.6) Find Derivative of Rational Power

123) D
ID: TCALC11W 3.6.5–1
Diff: 0 Page Ref: 205–211
Objective: (3.6) Solve Apps: Slopes, Tangents, and Normals

124) B
ID: TCALC11W 3.4.3-2
Diff: 0 Page Ref: 183-188
Objective: (3.4) Solve Apps: Tangents

125) C
ID: TCALC11W 3.6.5-4
Diff: 0 Page Ref: 205-211
Objective: (3.6) Solve Apps: Slopes, Tangents, and Normals

126) D
ID: TCALC11W 3.1.3-1
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Equation of Tangent Line at Point

127) D
ID: TCALC11W 3.5.7-3
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Cartesian Equation and Graph Given Parametric Equations

128) C
ID: TCALC11W 3.6.4-1
Diff: 0 Page Ref: 205-211
Objective: (3.6) Find Slope, Tangent Line, or Normal Line

129) D
ID: TCALC11W 3.3.5-10
Diff: 0 Page Ref: 171-179
Objective: (3.3) Solve Apps: Economics and Other Applications

130) D
ID: TCALC11W 3.6.4-2
Diff: 0 Page Ref: 205-211
Objective: (3.6) Find Slope, Tangent Line, or Normal Line

131) A
ID: TCALC11W 3.2.7-3
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Second Derivative of Product/Quotient

132) C
ID: TCALC11W 3.1.5-6
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Any Values at Which Derivative is Not Defined

133) B
ID: TCALC11W 3.1.7-2
Diff: 0 Page Ref: 147-155
Objective: (3.1) Compare Right-Hand and Left-Hand Derivatives

134) C
ID: TCALC11W 3.3.2-6
Diff: 0 Page Ref: 171-179
Objective: (3.3) Solve Apps: Motion

135) A
ID: TCALC11W 3.2.6-2
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Product/Quotient

136) C
ID: TCALC11W 3.1.6-2
Diff: 0 Page Ref: 147-155
Objective: (3.1) Graph Derivative or Function Given Graph of Other

137) B
ID: TCALC11W 3.2.1-5
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Polynomial

138) C
ID: TCALC11W 3.8.4-7
Diff: 0 Page Ref: 221-231
Objective: (3.8) Find Differential

139) D
ID: TCALC11W 3.2.2-2
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Second Derivative of Polynomial

140) D
ID: TCALC11W 3.7.3-1
Diff: 0 Page Ref: 213-217
Objective: (3.7) Solve Apps: Related Rates II

141) B
ID: TCALC11W 3.2.7-5
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Second Derivative of Product/Quotient

142) A
ID: TCALC11W 3.3.4-1
Diff: 0 Page Ref: 171-179
Objective: (3.3) Identify Function and Its Derivatives from Graph

143) D
ID: TCALC11W 3.6.1-3
Diff: 0 Page Ref: 205-211
Objective: (3.6) Find Derivative of Rational Power

144) B
ID: TCALC11W 3.2.3-4
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Product

145) C
ID: TCALC11W 3.3.3-4
Diff: 0 Page Ref: 171-179
Objective: (3.3) Analyze Motion Depicted in Graph

146) D
ID: TCALC11W 3.6.6–1
Diff: 0 Page Ref: 205–211
Objective: (3.6) Find Slope From Implicitly Defined Parametric Equations

147) D
ID: TCALC11W 3.8.1–1
Diff: 0 Page Ref: 221–231
Objective: (3.8) Find Linearization of Function at Point

148) D
ID: TCALC11W 3.1.1–1
Diff: 0 Page Ref: 147–155
Objective: (3.1) Find Derivative and Evaluate at Point

149) A
ID: TCALC11W 3.8.7–10
Diff: 0 Page Ref: 221–231
Objective: (3.8) Solve Apps: Differentials

150) D
ID: TCALC11W 3.7.1–7
Diff: 0 Page Ref: 213–217
Objective: (3.7) Find Related Rate Equation

151) A
ID: TCALC11W 3.8.1–5
Diff: 0 Page Ref: 221–231
Objective: (3.8) Find Linearization of Function at Point

152) B
ID: TCALC11W 3.3.4–2
Diff: 0 Page Ref: 171–179
Objective: (3.3) Identify Function and Its Derivatives from Graph

153) C
ID: TCALC11W 3.6.1–1
Diff: 0 Page Ref: 205–211
Objective: (3.6) Find Derivative of Rational Power

154) B
ID: TCALC11W 3.3.4–4
Diff: 0 Page Ref: 171–179
Objective: (3.3) Identify Function and Its Derivatives from Graph

155) C
ID: TCALC11W 3.6.3–4
Diff: 0 Page Ref: 205–211
Objective: (3.6) Use Implicit Diff to Find First and Second Derivatives

156) D
ID: TCALC11W 3.7.1–9
Diff: 0 Page Ref: 213–217
Objective: (3.7) Find Related Rate Equation

157) B
ID: TCALC11W 3.8.5-5
Diff: 0 Page Ref: 221-231
Objective: (3.8) Find Approximation Error

158) C
ID: TCALC11W 3.1.3-2
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Equation of Tangent Line at Point

159) B
ID: TCALC11W 3.4.5-5
Diff: 0 Page Ref: 183-188
Objective: (3.4) Solve Apps: Simple Harmonic Motion

160) B
ID: TCALC11W 3.2.3-3
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Product

161) B
ID: TCALC11W 3.1.1-5
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Derivative and Evaluate at Point

162) B
ID: TCALC11W 3.6.4-7
Diff: 0 Page Ref: 205-211
Objective: (3.6) Find Slope, Tangent Line, or Normal Line

163) D
ID: TCALC11W 3.4.5-3
Diff: 0 Page Ref: 183-188
Objective: (3.4) Solve Apps: Simple Harmonic Motion

164) B
ID: TCALC11W 3.8.7-4
Diff: 0 Page Ref: 221-231
Objective: (3.8) Solve Apps: Differentials

165) B
ID: TCALC11W 3.2.2-5
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Second Derivative of Polynomial

166) C
ID: TCALC11W 3.5.11-7
Diff: 0 Page Ref: 190-201
Objective: (3.5) Solve Apps: The Chain Rule

167) D
ID: TCALC11W 3.8.1-2
Diff: 0 Page Ref: 221-231
Objective: (3.8) Find Linearization of Function at Point

168) D
ID: TCALC11W 3.2.9-3
Diff: 0 Page Ref: 159-168
Objective: (3.2) Solve Apps: Differentiation Rules

169) A
ID: TCALC11W 3.5.3-8
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Derivative Using Chain Rule

170) A
ID: TCALC11W 3.5.9-6
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Equation of Tangent Given Parametric Equations

171) A
ID: TCALC11W 3.6.1-5
Diff: 0 Page Ref: 205-211
Objective: (3.6) Find Derivative of Rational Power

172) D
ID: TCALC11W 3.2.7-4
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Second Derivative of Product/Quotient

173) B
ID: TCALC11W 3.4.1-7
Diff: 0 Page Ref: 183-188
Objective: (3.4) Find Derivative of Trigonometric Function

174) A
ID: TCALC11W 3.2.1-7
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Polynomial

175) C
ID: TCALC11W 3.5.4-2
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Second Derivative Using Chain Rule

176) C
ID: TCALC11W 3.5.1-7
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find dy/dx Given y = f(u) and u = g(x)

177) A
ID: TCALC11W 3.8.7-2
Diff: 0 Page Ref: 221-231
Objective: (3.8) Solve Apps: Differentials

178) C
ID: TCALC11W 3.5.5-8
Diff: 0 Page Ref: 190-201
Objective: (3.5) Evaluate Derivative of Composite Function

179) C
ID: TCALC11W 3.7.1-1
Diff: 0 Page Ref: 213-217
Objective: (3.7) Find Related Rate Equation

180) B
ID: TCALC11W 3.3.1-6
Diff: 0 Page Ref: 171-179
Objective: (3.3) Find Displacement/Velocity/Speed/Accel Given Position Function

181) B
ID: TCALC11W 3.4.3-6
Diff: 0 Page Ref: 183-188
Objective: (3.4) Solve Apps: Tangents

182) D
ID: TCALC11W 3.5.10-4
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Second Derivative Given Parametric Equations

183) A
ID: TCALC11W 3.3.1-4
Diff: 0 Page Ref: 171-179
Objective: (3.3) Find Displacement/Velocity/Speed/Accel Given Position Function

184) D
ID: TCALC11W 3.4.4-2
Diff: 0 Page Ref: 183-188
Objective: (3.4) Find Trigonometric Limit

185) B
ID: TCALC11W 3.5.10-6
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Second Derivative Given Parametric Equations

186) A
ID: TCALC11W 3.2.8-9
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative Given Numerical Values

187) D
ID: TCALC11W 3.2.4-8
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Quotient

188) C
ID: TCALC11W 3.6.3-8
Diff: 0 Page Ref: 205-211
Objective: (3.6) Use Implicit Diff to Find First and Second Derivatives

189) A
ID: TCALC11W 3.2.4-4
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Quotient

190) C
ID: TCALC11W 3.1.1-8
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Derivative and Evaluate at Point

191) C
ID: TCALC11W 3.5.5-7
Diff: 0 Page Ref: 190-201
Objective: (3.5) Evaluate Derivative of Composite Function

192) C
ID: TCALC11W 3.4.3-4
Diff: 0 Page Ref: 183-188
Objective: (3.4) Solve Apps: Tangents

193) D
ID: TCALC11W 3.1.2-1
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Slope of Tangent Line at Point

194) D
ID: TCALC11W 3.2.9-10
Diff: 0 Page Ref: 159-168
Objective: (3.2) Solve Apps: Differentiation Rules

195) B
ID: TCALC11W 3.7.3-2
Diff: 0 Page Ref: 213-217
Objective: (3.7) Solve Apps: Related Rates II

196) B
ID: TCALC11W 3.1.1-6
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Derivative and Evaluate at Point

197) A
ID: TCALC11W 3.3.5-4
Diff: 0 Page Ref: 171-179
Objective: (3.3) Solve Apps: Economics and Other Applications

198) A
ID: TCALC11W 3.5.11-1
Diff: 0 Page Ref: 190-201
Objective: (3.5) Solve Apps: The Chain Rule

199) B
ID: TCALC11W 3.2.3-7
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Product

200) D
ID: TCALC11W 3.3.5-9
Diff: 0 Page Ref: 171-179
Objective: (3.3) Solve Apps: Economics and Other Applications

201) B
ID: TCALC11W 3.1.1-9
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Derivative and Evaluate at Point

202) D
ID: TCALC11W 3.8.5-3
Diff: 0 Page Ref: 221-231
Objective: (3.8) Find Approximation Error

203) C
ID: TCALC11W 3.6.4-8
Diff: 0 Page Ref: 205-211
Objective: (3.6) Find Slope, Tangent Line, or Normal Line

204) C
ID: TCALC11W 3.8.4-10
Diff: 0 Page Ref: 221-231
Objective: (3.8) Find Differential

205) A
ID: TCALC11W 3.3.2-3
Diff: 0 Page Ref: 171-179
Objective: (3.3) Solve Apps: Motion

206) B
ID: TCALC11W 3.5.11-8
Diff: 0 Page Ref: 190-201
Objective: (3.5) Solve Apps: The Chain Rule

207) D
ID: TCALC11W 3.4.1-2
Diff: 0 Page Ref: 183-188
Objective: (3.4) Find Derivative of Trigonometric Function

208) A
ID: TCALC11W 3.6.3-9
Diff: 0 Page Ref: 205-211
Objective: (3.6) Use Implicit Diff to Find First and Second Derivatives

209) A
ID: TCALC11W 3.6.3-7
Diff: 0 Page Ref: 205-211
Objective: (3.6) Use Implicit Diff to Find First and Second Derivatives

210) C
ID: TCALC11W 3.4.4-3
Diff: 0 Page Ref: 183-188
Objective: (3.4) Find Trigonometric Limit

211) D
ID: TCALC11W 3.7.2-5
Diff: 0 Page Ref: 213-217
Objective: (3.7) Solve Apps: Related Rates I

212) C
ID: TCALC11W 3.5.3–1
Diff: 0 Page Ref: 190–201
Objective: (3.5) Find Derivative Using Chain Rule

213) A
ID: TCALC11W 3.5.5–9
Diff: 0 Page Ref: 190–201
Objective: (3.5) Evaluate Derivative of Composite Function

214) C
ID: TCALC11W 3.2.4–6
Diff: 0 Page Ref: 159–168
Objective: (3.2) Find Derivative of Quotient

215) C
ID: TCALC11W 3.2.6–4
Diff: 0 Page Ref: 159–168
Objective: (3.2) Find Derivative of Product/Quotient

216) C
ID: TCALC11W 3.1.2–3
Diff: 0 Page Ref: 147–155
Objective: (3.1) Find Slope of Tangent Line at Point

217) A
ID: TCALC11W 3.6.3–3
Diff: 0 Page Ref: 205–211
Objective: (3.6) Use Implicit Diff to Find First and Second Derivatives

218) B
ID: TCALC11W 3.7.1–2
Diff: 0 Page Ref: 213–217
Objective: (3.7) Find Related Rate Equation

219) D
ID: TCALC11W 3.2.7–2
Diff: 0 Page Ref: 159–168
Objective: (3.2) Find Second Derivative of Product/Quotient

220) D
ID: TCALC11W 3.3.1–5
Diff: 0 Page Ref: 171–179
Objective: (3.3) Find Displacement/Velocity/Speed/Accel Given Position Function

221) C
ID: TCALC11W 3.3.5–2
Diff: 0 Page Ref: 171–179
Objective: (3.3) Solve Apps: Economics and Other Applications

222) C
ID: TCALC11W 3.6.4–9
Diff: 0 Page Ref: 205–211
Objective: (3.6) Find Slope, Tangent Line, or Normal Line

223) A
ID: TCALC11W 3.3.3-6
Diff: 0 Page Ref: 171-179
Objective: (3.3) Analyze Motion Depicted in Graph

224) B
ID: TCALC11W 3.5.4-6
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Second Derivative Using Chain Rule

225) C
ID: TCALC11W 3.5.5-1
Diff: 0 Page Ref: 190-201
Objective: (3.5) Evaluate Derivative of Composite Function

226) D
ID: TCALC11W 3.8.7-1
Diff: 0 Page Ref: 221-231
Objective: (3.8) Solve Apps: Differentials

227) D
ID: TCALC11W 3.2.8-5
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative Given Numerical Values

228) D
ID: TCALC11W 3.8.5-1
Diff: 0 Page Ref: 221-231
Objective: (3.8) Find Approximation Error

229) C
ID: TCALC11W 3.6.4-5
Diff: 0 Page Ref: 205-211
Objective: (3.6) Find Slope, Tangent Line, or Normal Line

230) C
ID: TCALC11W 3.7.3-6
Diff: 0 Page Ref: 213-217
Objective: (3.7) Solve Apps: Related Rates II

231) B
ID: TCALC11W 3.4.3-7
Diff: 0 Page Ref: 183-188
Objective: (3.4) Solve Apps: Tangents

232) D
ID: TCALC11W 3.8.7-7
Diff: 0 Page Ref: 221-231
Objective: (3.8) Solve Apps: Differentials

233) C
ID: TCALC11W 3.5.6-2
Diff: 0 Page Ref: 190-201
Objective: (3.5) Apply Chain Rule Given f, g, f ', g '

234) B
ID: TCALC11W 3.6.1-8
Diff: 0 Page Ref: 205-211
Objective: (3.6) Find Derivative of Rational Power

235) D
ID: TCALC11W 3.5.3-6
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Derivative Using Chain Rule

236) C
ID: TCALC11W 3.5.4-3
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Second Derivative Using Chain Rule

237) A
ID: TCALC11W 3.3.2-4
Diff: 0 Page Ref: 171-179
Objective: (3.3) Solve Apps: Motion

238) C
ID: TCALC11W 3.2.7-1
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Second Derivative of Product/Quotient

239) A
ID: TCALC11W 3.8.1-3
Diff: 0 Page Ref: 221-231
Objective: (3.8) Find Linearization of Function at Point

240) C
ID: TCALC11W 3.2.3-2
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Product

241) B
ID: TCALC11W 3.8.6-2
Diff: 0 Page Ref: 221-231
Objective: (3.8) Write Differential Formula to Estimate Change

242) C
ID: TCALC11W 3.4.2-4
Diff: 0 Page Ref: 183-188
Objective: (3.4) Find Higher-Order Derivative of Trigonometric Function

243) D
ID: TCALC11W 3.3.3-2
Diff: 0 Page Ref: 171-179
Objective: (3.3) Analyze Motion Depicted in Graph

244) B
ID: TCALC11W 3.5.5-6
Diff: 0 Page Ref: 190-201
Objective: (3.5) Evaluate Derivative of Composite Function

245) C
ID: TCALC11W 3.1.8-2
Diff: 0 Page Ref: 147-155
Objective: (3.1) Determine if Function Differentiable/Continuous at Point

246) B
ID: TCALC11W 3.5.11-5
Diff: 0 Page Ref: 190-201
Objective: (3.5) Solve Apps: The Chain Rule

247) B
ID: TCALC11W 3.3.1-1
Diff: 0 Page Ref: 171-179
Objective: (3.3) Find Displacement/Velocity/Speed/Accel Given Position Function

248) D
ID: TCALC11W 3.1.5-2
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Any Values at Which Derivative is Not Defined

249) D
ID: TCALC11W 3.2.6-3
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Product/Quotient

250) B
ID: TCALC11W 3.8.5-4
Diff: 0 Page Ref: 221-231
Objective: (3.8) Find Approximation Error

251) B
ID: TCALC11W 3.8.7-8
Diff: 0 Page Ref: 221-231
Objective: (3.8) Solve Apps: Differentials

252) B
ID: TCALC11W 3.8.4-2
Diff: 0 Page Ref: 221-231
Objective: (3.8) Find Differential

253) D
ID: TCALC11W 3.1.5-5
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Any Values at Which Derivative is Not Defined

254) D
ID: TCALC11W 3.3.5-7
Diff: 0 Page Ref: 171-179
Objective: (3.3) Solve Apps: Economics and Other Applications

255) B
ID: TCALC11W 3.2.1-6
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Polynomial

256) C
ID: TCALC11W 3.5.3-3
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Derivative Using Chain Rule

257) C
ID: TCALC11W 3.3.5-6
Diff: 0 Page Ref: 171-179
Objective: (3.3) Solve Apps: Economics and Other Applications

258) D
ID: TCALC11W 3.5.9-4
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Equation of Tangent Given Parametric Equations

259) A
ID: TCALC11W 3.2.8-3
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative Given Numerical Values

260) D
ID: TCALC11W 3.5.1-3
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find dy/dx Given y = f(u) and u = g(x)

261) B
ID: TCALC11W 3.3.5-8
Diff: 0 Page Ref: 171-179
Objective: (3.3) Solve Apps: Economics and Other Applications

262) D
ID: TCALC11W 3.8.3-4
Diff: 0 Page Ref: 221-231
Objective: (3.8) Use Linear Approximation of (1 + x)^k

263) A
ID: TCALC11W 3.6.1-9
Diff: 0 Page Ref: 205-211
Objective: (3.6) Find Derivative of Rational Power

264) A
ID: TCALC11W 3.2.1-1
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Polynomial

265) B
ID: TCALC11W 3.7.3-3
Diff: 0 Page Ref: 213-217
Objective: (3.7) Solve Apps: Related Rates II

266) B
ID: TCALC11W 3.1.2-2
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Slope of Tangent Line at Point

267) B
ID: TCALC11W 3.8.4-5
Diff: 0 Page Ref: 221-231
Objective: (3.8) Find Differential

268) B
ID: TCALC11W 3.6.2-1
Diff: 0 Page Ref: 205-211
Objective: (3.6) Use Implicit Differentiation to Find Derivative

269) B
ID: TCALC11W 3.5.7-4
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Cartesian Equation and Graph Given Parametric Equations

270) B
ID: TCALC11W 3.5.3-7
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Derivative Using Chain Rule

271) A
ID: TCALC11W 3.2.3-8
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Product

272) A
ID: TCALC11W 3.6.2-4
Diff: 0 Page Ref: 205-211
Objective: (3.6) Use Implicit Differentiation to Find Derivative

273) D
ID: TCALC11W 3.7.3-5
Diff: 0 Page Ref: 213-217
Objective: (3.7) Solve Apps: Related Rates II

274) B
ID: TCALC11W 3.8.5-2
Diff: 0 Page Ref: 221-231
Objective: (3.8) Find Approximation Error

275) C
ID: TCALC11W 3.6.6-4
Diff: 0 Page Ref: 205-211
Objective: (3.6) Find Slope From Implicitly Defined Parametric Equations

276) C
ID: TCALC11W 3.5.10-2
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Second Derivative Given Parametric Equations

277) A
ID: TCALC11W 3.8.3-1
Diff: 0 Page Ref: 221-231
Objective: (3.8) Use Linear Approximation of (1 + x)^k

278) A
ID: TCALC11W 3.5.5–3
Diff: 0 Page Ref: 190–201
Objective: (3.5) Evaluate Derivative of Composite Function

279) D
ID: TCALC11W 3.8.4–9
Diff: 0 Page Ref: 221–231
Objective: (3.8) Find Differential

280) A
ID: TCALC11W 3.6.5–3
Diff: 0 Page Ref: 205–211
Objective: (3.6) Solve Apps: Slopes, Tangents, and Normals

281) A
ID: TCALC11W 3.4.3–3
Diff: 0 Page Ref: 183–188
Objective: (3.4) Solve Apps: Tangents

282) B
ID: TCALC11W 3.6.1–10
Diff: 0 Page Ref: 205–211
Objective: (3.6) Find Derivative of Rational Power

283) B
ID: TCALC11W 3.8.3–5
Diff: 0 Page Ref: 221–231
Objective: (3.8) Use Linear Approximation of (1 + x)^k

284) A
ID: TCALC11W 3.4.4–5
Diff: 0 Page Ref: 183–188
Objective: (3.4) Find Trigonometric Limit

285) D
ID: TCALC11W 3.2.1–2
Diff: 0 Page Ref: 159–168
Objective: (3.2) Find Derivative of Polynomial

286) B
ID: TCALC11W 3.8.5–6
Diff: 0 Page Ref: 221–231
Objective: (3.8) Find Approximation Error

287) A
ID: TCALC11W 3.8.7–5
Diff: 0 Page Ref: 221–231
Objective: (3.8) Solve Apps: Differentials

288) B
ID: TCALC11W 3.5.3–5
Diff: 0 Page Ref: 190–201
Objective: (3.5) Find Derivative Using Chain Rule

289) A
ID: TCALC11W 3.8.4-1
Diff: 0 Page Ref: 221-231
Objective: (3.8) Find Differential

290) D
ID: TCALC11W 3.6.3-1
Diff: 0 Page Ref: 205-211
Objective: (3.6) Use Implicit Diff to Find First and Second Derivatives

291) B
ID: TCALC11W 3.5.6-4
Diff: 0 Page Ref: 190-201
Objective: (3.5) Apply Chain Rule Given f, g, f ', g '

292) C
ID: TCALC11W 3.7.1-8
Diff: 0 Page Ref: 213-217
Objective: (3.7) Find Related Rate Equation

293) A
ID: TCALC11W 3.8.3-3
Diff: 0 Page Ref: 221-231
Objective: (3.8) Use Linear Approximation of (1 + x)^k

294) B
ID: TCALC11W 3.2.1-9
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Polynomial

295) B
ID: TCALC11W 3.8.3-2
Diff: 0 Page Ref: 221-231
Objective: (3.8) Use Linear Approximation of (1 + x)^k

296) B
ID: TCALC11W 3.2.2-7
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Second Derivative of Polynomial

297) C
ID: TCALC11W 3.3.4-5
Diff: 0 Page Ref: 171-179
Objective: (3.3) Identify Function and Its Derivatives from Graph

298) D
ID: TCALC11W 3.2.2-3
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Second Derivative of Polynomial

299) D
ID: TCALC11W 3.6.6-5
Diff: 0 Page Ref: 205-211
Objective: (3.6) Find Slope From Implicitly Defined Parametric Equations

300) C
ID: TCALC11W 3.3.2-7
Diff: 0 Page Ref: 171-179
Objective: (3.3) Solve Apps: Motion

301) D
ID: TCALC11W 3.1.1-2
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Derivative and Evaluate at Point

302) D
ID: TCALC11W 3.3.1-2
Diff: 0 Page Ref: 171-179
Objective: (3.3) Find Displacement/Velocity/Speed/Accel Given Position Function

303) C
ID: TCALC11W 3.1.3-3
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Equation of Tangent Line at Point

304) C
ID: TCALC11W 3.5.5-5
Diff: 0 Page Ref: 190-201
Objective: (3.5) Evaluate Derivative of Composite Function

305) C
ID: TCALC11W 3.4.3-10
Diff: 0 Page Ref: 183-188
Objective: (3.4) Solve Apps: Tangents

306) A
ID: TCALC11W 3.5.2-4
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find y = f(u), u = g(x), dy/dx Given y = f(x)

307) B
ID: TCALC11W 3.5.6-6
Diff: 0 Page Ref: 190-201
Objective: (3.5) Apply Chain Rule Given f, g, f ', g '

308) D
ID: TCALC11W 3.6.2-3
Diff: 0 Page Ref: 205-211
Objective: (3.6) Use Implicit Differentiation to Find Derivative

309) C
ID: TCALC11W 3.6.4-4
Diff: 0 Page Ref: 205-211
Objective: (3.6) Find Slope, Tangent Line, or Normal Line

310) B
ID: TCALC11W 3.8.4-8
Diff: 0 Page Ref: 221-231
Objective: (3.8) Find Differential

311) A
ID: TCALC11W 3.4.3-8
Diff: 0 Page Ref: 183-188
Objective: (3.4) Solve Apps: Tangents

312) B
ID: TCALC11W 3.6.6-3
Diff: 0 Page Ref: 205-211
Objective: (3.6) Find Slope From Implicitly Defined Parametric Equations

313) D
ID: TCALC11W 3.8.7-9
Diff: 0 Page Ref: 221-231
Objective: (3.8) Solve Apps: Differentials

314) A
ID: TCALC11W 3.4.1-3
Diff: 0 Page Ref: 183-188
Objective: (3.4) Find Derivative of Trigonometric Function

315) C
ID: TCALC11W 3.2.4-3
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Quotient

316) B
ID: TCALC11W 3.1.5-8
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Any Values at Which Derivative is Not Defined

317) A
ID: TCALC11W 3.2.3-1
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Product

318) B
ID: TCALC11W 3.2.6-1
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Product/Quotient

319) C
ID: TCALC11W 3.1.3-4
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Equation of Tangent Line at Point

320) B
ID: TCALC11W 3.2.2-6
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Second Derivative of Polynomial

321) C
ID: TCALC11W 3.8.2-3
Diff: 0 Page Ref: 221-231
Objective: (3.8) Find Linearization at Nearby Integer

322) A
ID: TCALC11W 3.6.3-5
Diff: 0 Page Ref: 205-211
Objective: (3.6) Use Implicit Diff to Find First and Second Derivatives

323) B
ID: TCALC11W 3.1.3-7
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Equation of Tangent Line at Point

324) D
ID: TCALC11W 3.5.10-3
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Second Derivative Given Parametric Equations

325) A
ID: TCALC11W 3.7.3-7
Diff: 0 Page Ref: 213-217
Objective: (3.7) Solve Apps: Related Rates II

326) A
ID: TCALC11W 3.6.4-3
Diff: 0 Page Ref: 205-211
Objective: (3.6) Find Slope, Tangent Line, or Normal Line

327) D
ID: TCALC11W 3.4.3-1
Diff: 0 Page Ref: 183-188
Objective: (3.4) Solve Apps: Tangents

328) C
ID: TCALC11W 3.5.11-6
Diff: 0 Page Ref: 190-201
Objective: (3.5) Solve Apps: The Chain Rule

329) A
ID: TCALC11W 3.5.11-3
Diff: 0 Page Ref: 190-201
Objective: (3.5) Solve Apps: The Chain Rule

330) C
ID: TCALC11W 3.6.4-6
Diff: 0 Page Ref: 205-211
Objective: (3.6) Find Slope, Tangent Line, or Normal Line

331) D
ID: TCALC11W 3.2.8-7
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative Given Numerical Values

332) C
ID: TCALC11W 3.6.5-8
Diff: 0 Page Ref: 205-211
Objective: (3.6) Solve Apps: Slopes, Tangents, and Normals

333) A
ID: TCALC11W 3.7.2–1
Diff: 0 Page Ref: 213–217
Objective: (3.7) Solve Apps: Related Rates I

334) C
ID: TCALC11W 3.4.2–2
Diff: 0 Page Ref: 183–188
Objective: (3.4) Find Higher–Order Derivative of Trigonometric Function

335) B
ID: TCALC11W 3.5.2–1
Diff: 0 Page Ref: 190–201
Objective: (3.5) Find y = f(u), u = g(x), dy/dx Given y = f(x)

336) A
ID: TCALC11W 3.4.5–7
Diff: 0 Page Ref: 183–188
Objective: (3.4) Solve Apps: Simple Harmonic Motion

337) D
ID: TCALC11W 3.5.9–5
Diff: 0 Page Ref: 190–201
Objective: (3.5) Find Equation of Tangent Given Parametric Equations

338) D
ID: TCALC11W 3.2.9–8
Diff: 0 Page Ref: 159–168
Objective: (3.2) Solve Apps: Differentiation Rules

339) D
ID: TCALC11W 3.3.3–10
Diff: 0 Page Ref: 171–179
Objective: (3.3) Analyze Motion Depicted in Graph

340) D
ID: TCALC11W 3.5.11–2
Diff: 0 Page Ref: 190–201
Objective: (3.5) Solve Apps: The Chain Rule

341) A
ID: TCALC11W 3.2.2–1
Diff: 0 Page Ref: 159–168
Objective: (3.2) Find Second Derivative of Polynomial

342) B
ID: TCALC11W 3.6.5–5
Diff: 0 Page Ref: 205–211
Objective: (3.6) Solve Apps: Slopes, Tangents, and Normals

343) B
ID: TCALC11W 3.4.2–1
Diff: 0 Page Ref: 183–188
Objective: (3.4) Find Higher–Order Derivative of Trigonometric Function

344) D
ID: TCALC11W 3.2.2-8
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Second Derivative of Polynomial

345) A
ID: TCALC11W 3.4.4-4
Diff: 0 Page Ref: 183-188
Objective: (3.4) Find Trigonometric Limit

346) D
ID: TCALC11W 3.4.1-9
Diff: 0 Page Ref: 183-188
Objective: (3.4) Find Derivative of Trigonometric Function

347) B
ID: TCALC11W 3.1.3-6
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Equation of Tangent Line at Point

348) C
ID: TCALC11W 3.1.5-9
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Any Values at Which Derivative is Not Defined

349) B
ID: TCALC11W 3.8.6-1
Diff: 0 Page Ref: 221-231
Objective: (3.8) Write Differential Formula to Estimate Change

350) B
ID: TCALC11W 3.6.2-8
Diff: 0 Page Ref: 205-211
Objective: (3.6) Use Implicit Differentiation to Find Derivative

351) B
ID: TCALC11W 3.2.4-7
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Quotient

352) D
ID: TCALC11W 3.4.5-6
Diff: 0 Page Ref: 183-188
Objective: (3.4) Solve Apps: Simple Harmonic Motion

353) A
ID: TCALC11W 3.1.8-1
Diff: 0 Page Ref: 147-155
Objective: (3.1) Determine if Function Differentiable/Continuous at Point

354) A
ID: TCALC11W 3.1.5-4
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Any Values at Which Derivative is Not Defined

355) A
ID: TCALC11W 3.2.8–10
Diff: 0 Page Ref: 159–168
Objective: (3.2) Find Derivative Given Numerical Values

356) A
ID: TCALC11W 3.2.9–7
Diff: 0 Page Ref: 159–168
Objective: (3.2) Solve Apps: Differentiation Rules

357) A
ID: TCALC11W 3.7.1–6
Diff: 0 Page Ref: 213–217
Objective: (3.7) Find Related Rate Equation

358) B
ID: TCALC11W 3.2.8–8
Diff: 0 Page Ref: 159–168
Objective: (3.2) Find Derivative Given Numerical Values

359) D
ID: TCALC11W 3.4.2–3
Diff: 0 Page Ref: 183–188
Objective: (3.4) Find Higher–Order Derivative of Trigonometric Function

360) A
ID: TCALC11W 3.8.4–6
Diff: 0 Page Ref: 221–231
Objective: (3.8) Find Differential

361) D
ID: TCALC11W 3.5.4–4
Diff: 0 Page Ref: 190–201
Objective: (3.5) Find Second Derivative Using Chain Rule

362) D
ID: TCALC11W 3.1.1–4
Diff: 0 Page Ref: 147–155
Objective: (3.1) Find Derivative and Evaluate at Point

363) A
ID: TCALC11W 3.5.6–3
Diff: 0 Page Ref: 190–201
Objective: (3.5) Apply Chain Rule Given f, g, f ', g '

364) C
ID: TCALC11W 3.3.1–3
Diff: 0 Page Ref: 171–179
Objective: (3.3) Find Displacement/Velocity/Speed/Accel Given Position Function

365) B
ID: TCALC11W 3.2.1–3
Diff: 0 Page Ref: 159–168
Objective: (3.2) Find Derivative of Polynomial

366) C
ID: TCALC11W 3.3.2-8
Diff: 0 Page Ref: 171-179
Objective: (3.3) Solve Apps: Motion

367) B
ID: TCALC11W 3.4.3-5
Diff: 0 Page Ref: 183-188
Objective: (3.4) Solve Apps: Tangents

368) A
ID: TCALC11W 3.5.2-5
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find y = f(u), u = g(x), dy/dx Given y = f(x)

369) A
ID: TCALC11W 3.4.3-9
Diff: 0 Page Ref: 183-188
Objective: (3.4) Solve Apps: Tangents

370) D
ID: TCALC11W 3.7.2-4
Diff: 0 Page Ref: 213-217
Objective: (3.7) Solve Apps: Related Rates I

371) D
ID: TCALC11W 3.8.1-6
Diff: 0 Page Ref: 221-231
Objective: (3.8) Find Linearization of Function at Point

372) C
ID: TCALC11W 3.6.6-6
Diff: 0 Page Ref: 205-211
Objective: (3.6) Find Slope From Implicitly Defined Parametric Equations

373) D
ID: TCALC11W 3.2.9-9
Diff: 0 Page Ref: 159-168
Objective: (3.2) Solve Apps: Differentiation Rules

374) D
ID: TCALC11W 3.3.2-2
Diff: 0 Page Ref: 171-179
Objective: (3.3) Solve Apps: Motion

375) D
ID: TCALC11W 3.8.2-1
Diff: 0 Page Ref: 221-231
Objective: (3.8) Find Linearization at Nearby Integer

376) C
ID: TCALC11W 3.4.1-1
Diff: 0 Page Ref: 183-188
Objective: (3.4) Find Derivative of Trigonometric Function

377) D
ID: TCALC11W 3.5.11-4
Diff: 0 Page Ref: 190-201
Objective: (3.5) Solve Apps: The Chain Rule

378) A
ID: TCALC11W 3.2.9-4
Diff: 0 Page Ref: 159-168
Objective: (3.2) Solve Apps: Differentiation Rules

379) A
ID: TCALC11W 3.4.1-6
Diff: 0 Page Ref: 183-188
Objective: (3.4) Find Derivative of Trigonometric Function

380) D
ID: TCALC11W 3.3.2-5
Diff: 0 Page Ref: 171-179
Objective: (3.3) Solve Apps: Motion

381) C
ID: TCALC11W 3.2.2-9
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Second Derivative of Polynomial

382) A
ID: TCALC11W 3.3.3-7
Diff: 0 Page Ref: 171-179
Objective: (3.3) Analyze Motion Depicted in Graph

383) A
ID: TCALC11W 3.5.1-4
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find dy/dx Given $y = f(u)$ and $u = g(x)$

384) C
ID: TCALC11W 3.6.3-6
Diff: 0 Page Ref: 205-211
Objective: (3.6) Use Implicit Diff to Find First and Second Derivatives

385) A
ID: TCALC11W 3.3.5-5
Diff: 0 Page Ref: 171-179
Objective: (3.3) Solve Apps: Economics and Other Applications

386) A
ID: TCALC11W 3.4.1-8
Diff: 0 Page Ref: 183-188
Objective: (3.4) Find Derivative of Trigonometric Function

387) C
ID: TCALC11W 3.5.7-1
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Cartesian Equation and Graph Given Parametric Equations

388) A
ID: TCALC11W 3.8.2-2
Diff: 0 Page Ref: 221-231
Objective: (3.8) Find Linearization at Nearby Integer

389) D
ID: TCALC11W 3.8.1-7
Diff: 0 Page Ref: 221-231
Objective: (3.8) Find Linearization of Function at Point

390) C
ID: TCALC11W 3.8.5-8
Diff: 0 Page Ref: 221-231
Objective: (3.8) Find Approximation Error

391) C
ID: TCALC11W 3.2.4-5
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Quotient

392) B
ID: TCALC11W 3.8.4-3
Diff: 0 Page Ref: 221-231
Objective: (3.8) Find Differential

393) A
ID: TCALC11W 3.4.1-4
Diff: 0 Page Ref: 183-188
Objective: (3.4) Find Derivative of Trigonometric Function

394) B
ID: TCALC11W 3.2.9-5
Diff: 0 Page Ref: 159-168
Objective: (3.2) Solve Apps: Differentiation Rules

395) D
ID: TCALC11W 3.5.10-1
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Second Derivative Given Parametric Equations

396) C
ID: TCALC11W 3.3.3-5
Diff: 0 Page Ref: 171-179
Objective: (3.3) Analyze Motion Depicted in Graph

397) D
ID: TCALC11W 3.6.1-4
Diff: 0 Page Ref: 205-211
Objective: (3.6) Find Derivative of Rational Power

398) D
ID: TCALC11W 3.5.2-6
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find $y = f(u)$, $u = g(x)$, dy/dx Given $y = f(x)$

399) C
ID: TCALC11W 3.1.5-1
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Any Values at Which Derivative is Not Defined

400) A
ID: TCALC11W 3.7.3-8
Diff: 0 Page Ref: 213-217
Objective: (3.7) Solve Apps: Related Rates II

401) A
ID: TCALC11W 3.5.5-2
Diff: 0 Page Ref: 190-201
Objective: (3.5) Evaluate Derivative of Composite Function

402) D
ID: TCALC11W 3.5.6-1
Diff: 0 Page Ref: 190-201
Objective: (3.5) Apply Chain Rule Given f, g, f ', g '

403) C
ID: TCALC11W 3.5.2-3
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find $y = f(u)$, $u = g(x)$, dy/dx Given $y = f(x)$

404) A
ID: TCALC11W 3.7.1-4
Diff: 0 Page Ref: 213-217
Objective: (3.7) Find Related Rate Equation

405) D
ID: TCALC11W 3.2.4-1
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Quotient

406) D
ID: TCALC11W 3.5.1-6
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find dy/dx Given $y = f(u)$ and $u = g(x)$

407) D
ID: TCALC11W 3.4.1-10
Diff: 0 Page Ref: 183-188
Objective: (3.4) Find Derivative of Trigonometric Function

408) A
ID: TCALC11W 3.3.5-3
Diff: 0 Page Ref: 171-179
Objective: (3.3) Solve Apps: Economics and Other Applications

409) B
ID: TCALC11W 3.5.9-1
Diff: 0 Page Ref: 190-201
Objective: (3.5) Find Equation of Tangent Given Parametric Equations

410) D
ID: TCALC11W 3.5.1–2
Diff: 0 Page Ref: 190–201
Objective: (3.5) Find dy/dx Given y = f(u) and u = g(x)

411) B
ID: TCALC11W 3.6.5–6
Diff: 0 Page Ref: 205–211
Objective: (3.6) Solve Apps: Slopes, Tangents, and Normals

412) B
ID: TCALC11W 3.2.2–4
Diff: 0 Page Ref: 159–168
Objective: (3.2) Find Second Derivative of Polynomial

413) D
ID: TCALC11W 3.8.1–4
Diff: 0 Page Ref: 221–231
Objective: (3.8) Find Linearization of Function at Point

414) D
ID: TCALC11W 3.7.2–2
Diff: 0 Page Ref: 213–217
Objective: (3.7) Solve Apps: Related Rates I

415) C
ID: TCALC11W 3.6.1–7
Diff: 0 Page Ref: 205–211
Objective: (3.6) Find Derivative of Rational Power

416) B
ID: TCALC11W 3.3.2–1
Diff: 0 Page Ref: 171–179
Objective: (3.3) Solve Apps: Motion

417) C
ID: TCALC11W 3.7.2–3
Diff: 0 Page Ref: 213–217
Objective: (3.7) Solve Apps: Related Rates I

418) D
ID: TCALC11W 3.2.8–6
Diff: 0 Page Ref: 159–168
Objective: (3.2) Find Derivative Given Numerical Values

419) C
ID: TCALC11W 3.5.3–2
Diff: 0 Page Ref: 190–201
Objective: (3.5) Find Derivative Using Chain Rule

420) D
ID: TCALC11W 3.4.2–6
Diff: 0 Page Ref: 183–188
Objective: (3.4) Find Higher–Order Derivative of Trigonometric Function

421) B
ID: TCALC11W 3.2.1-4
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Polynomial

422) A
ID: TCALC11W 3.4.5-2
Diff: 0 Page Ref: 183-188
Objective: (3.4) Solve Apps: Simple Harmonic Motion

423) D
ID: TCALC11W 3.2.7-6
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Second Derivative of Product/Quotient

424) C
ID: TCALC11W 3.7.1-3
Diff: 0 Page Ref: 213-217
Objective: (3.7) Find Related Rate Equation

425) D
ID: TCALC11W 3.2.3-5
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative of Product

426) A
ID: TCALC11W 3.7.3-4
Diff: 0 Page Ref: 213-217
Objective: (3.7) Solve Apps: Related Rates II

427) A
ID: TCALC11W 3.2.8-2
Diff: 0 Page Ref: 159-168
Objective: (3.2) Find Derivative Given Numerical Values

428) A
ID: TCALC11W 3.1.1-3
Diff: 0 Page Ref: 147-155
Objective: (3.1) Find Derivative and Evaluate at Point

429) B
ID: TCALC11W 3.1.7-1
Diff: 0 Page Ref: 147-155
Objective: (3.1) Compare Right-Hand and Left-Hand Derivatives