MATH 150/GRACEY
EXAM 2 PRACTICE/CHAPTER 2 Name_____

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

Find the indicated derivative.

1) Find y'' if $y = 8 \sin x$. 1) _____

A) $y'' = 8 \cos x$ B) $y'' = 8 \sin x$ C) $y'' = -8 \sin x$ D) $y'' = 64 \sin x$

2) Find y'' if $y = 6x \sin x$. 2) _____

A) $y'' = -12 \cos x + 6x \sin x$ B) $y'' = -6x \sin x$

C) $y'' = 6 \cos x - 12x \sin x$ D) $y'' = 12 \cos x - 6x \sin x$

Find y'.

3) $y = (4x^3 + 8)(2x^7 - 5)$ 3) _____

A) $80x^9 + 112x^6 - 60x^2$ B) $16x^9 + 112x^6 - 60x$

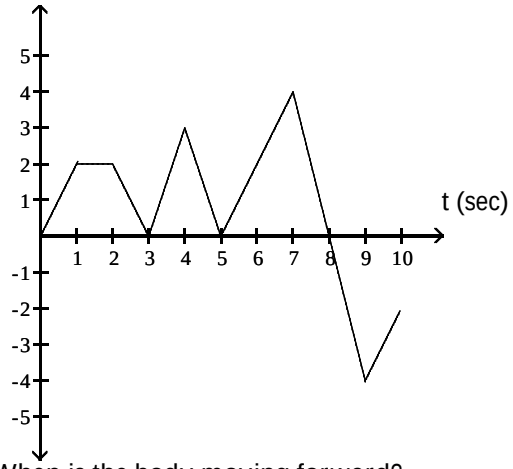
C) $80x^9 + 112x^6 - 60x$ D) $16x^9 + 112x^6 - 60x^2$

4) $y = (5x - 2)(6x + 1)$ 4) _____

A) $60x - 17$ B) $30x - 7$ C) $60x - 3.5$ D) $60x - 7$

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

5) 5) _____

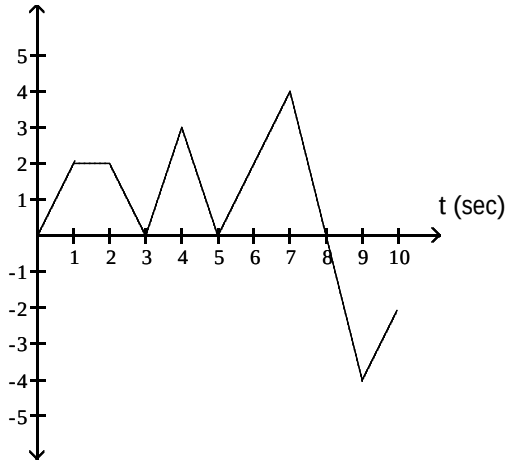


When is the body moving forward?

A) $0 < t < 1, 3 < t < 4, 5 < t < 7, 9 < t < 10$ B) $0 < t < 3, 3 < t < 5, 5 < t < 8$

C) $0 < t < 8$ D) $0 < t < 1, 3 < t < 4, 5 < t < 7$

6) s (m) 6) _____



What is the body's velocity when t = 2.5 sec?

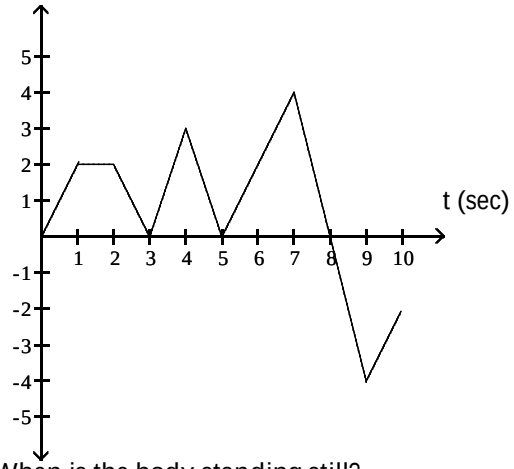
A) 1 m/sec B) 3 m/sec C) -2 m/sec D) 2 m/sec

7) $s = 4 \sin t - \cos t$ 7) _____

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

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

8) s (m) 8) _____



When is the body standing still?

A) $8 < t \le 10$ B) $1 < t < 2$

C) $2 < t < 3, 4 < t < 5, 7 < t < 9$ D) $t = 3, t = 5, t = 8$

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

9) $xy - x + y = 2$ 9) _____

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

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

10) $y^2 - x^2 = 4$ 10) _____

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

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

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

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

Find an equation of the tangent line at x = a.

11) $y = x^3 - 4x - 5;\ a = 2$ 11) _____

A) $y = -5$ B) $y = 3x - 21$ C) $y = 8x - 5$ D) $y = 8x - 21$

Find the derivative of the function.

12) $f(t) = (6 - t)(6 + t^3)^{-1}$ 12) _____

A) $f'(t) = \frac{2t^3 - 18t^2 - 6}{(6 + t^3)^2}$

B) $f'(t) = \frac{2t^3 - 18t^2 - 6}{6 + t^3}$

C) $f'(t) = \frac{-4t^3 + 18t^2 - 6}{(6 + t^3)^2}$

D) $f'(t) = \frac{-2t^3 + 18t^2 - 6}{(6 + t^3)^2}$

13) $y = \frac{1}{4}(9x + 9)^3 + \left(1 - \frac{1}{x^3}\right)^{-1}$ 13) _____

A) $\frac{27}{4}(9x + 9)^2 - \frac{3}{x^4}\left(1 - \frac{1}{x^3}\right)^{-2}$

B) $\frac{9}{4}(9x + 9)^2 + \frac{3}{x^4}\left(1 - \frac{1}{x^3}\right)^{-2}$

C) $\frac{3}{4}(9x + 9)^2 - \left(1 - \frac{1}{x^3}\right)^{-2}$

D) $\frac{3}{4}(9x)^2 - \left(\frac{3}{x^4}\right)^{-2}$

14) $y = \frac{x^2 - 3x + 2}{x^7 - 2}$ 14) _____

A) $y' = \frac{-5x^8 + 19x^7 - 14x^6 - 4x + 6}{(x^7 - 2)^2}$

B) $y' = \frac{-5x^8 + 18x^7 - 14x^6 - 3x + 6}{(x^7 - 2)^2}$

C) $y' = \frac{-5x^8 + 18x^7 - 13x^6 - 4x + 6}{(x^7 - 2)^2}$

D) $y' = \frac{-5x^8 + 18x^7 - 14x^6 - 4x + 6}{(x^7 - 2)^2}$

15) $q = \sqrt{20r - r^7}$ 15) _____

A) $\frac{-7r^6}{\sqrt{20r - r^7}}$ B) $\frac{20 - 7r^6}{2\sqrt{20r - r^7}}$ C) $\frac{1}{2\sqrt{20 - 7r^6}}$ D) $\frac{1}{2\sqrt{20r - r^7}}$

16) $h(x) = \left(\frac{\cos x}{1 + \sin x}\right)^5$ 16) _____

A) $\left(-\frac{4 \sin x}{\cos x}\right)\left(\frac{\cos x}{1 + \sin x}\right)^4$

B) $-5\left(\frac{\sin x}{\cos x}\right)^4$

C) $\frac{-5 \cos^4 x}{(1 + \sin x)^5}$

D) $5\left(\frac{\cos x}{1 + \sin x}\right)^4$

17) $y = (x + 1)^2(x^2 + 1)^{-3}$ 17) _____

A) $\frac{2(x + 1)(2x^2 - 3x - 1)}{(x^2 + 1)^4}$

B) $\frac{2(x + 1)(2x^2 + 3x - 1)}{(x^2 + 1)^4}$

C) $\frac{-2(x + 1)(2x^2 - 3x - 1)}{(x^2 + 1)^4}$

D) $\frac{-2(x + 1)(2x^2 + 3x - 1)}{(x^2 + 1)^4}$

18) $s = \sin\left(\frac{7\pi t}{2}\right) - \cos\left(\frac{7\pi t}{2}\right)$ 18) _____

A) $\frac{7\pi}{2}\cos\left(\frac{7\pi t}{2}\right) + \frac{7\pi}{2}\sin\left(\frac{7\pi t}{2}\right)$

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

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

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

19) $y = \frac{x^2 + 8x + 3}{\sqrt{x}}$ 19) _____

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

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

C) $y' = \frac{2x + 8}{x}$

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

20) $r = \frac{\sqrt{\theta} - 9}{\sqrt{\theta} + 9}$ 20) _____

A) $r' = \frac{18}{(\theta + 9)\sqrt{\theta^2 - 81}}$

B) $r' = -\frac{9}{\sqrt{\theta}(\theta + 9)^2}$

C) $r' = \frac{9}{\theta + 9}$

D) $r' = \frac{9}{\sqrt{\theta}(\theta + 9)^2}$

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.

21) $u(2) = 9, u'(2) = 4, v(2) = -3, v'(2) = -5.$ 21) _____

$\frac{d}{dx}\left(\frac{u}{v}\right)$ at $x = 2$

A) $\frac{33}{25}$ B) -11 C) $-\frac{19}{3}$ D) $\frac{11}{3}$

Find an equation for the tangent to the curve at the given point.

22) $f(x) = 10\sqrt{x} - x + 3, \ (100, 3)$ 22) _____

A) $y = -\frac{1}{2}x + 53$ B) $y = 3$ C) $y = -\frac{1}{2}x + 3$ D) $y = \frac{1}{2}x - 53$

Provide an appropriate response.

23) The curve $y = ax^2 + bx + c$ passes through the point (2, 8) and is tangent to the line $y = 2x$ at the origin. Find a, b, and c. 23) _____

A) $a = 0, b = 1, c = 2$ B) $a = 1, b = 2, c = 0$

C) $a = 2, b = 0, c = 1$ D) $a = 2, b = 0, c = 0$

24) Find an equation for the tangent to the curve $y = \frac{27}{x^2 + 2}$ at the point (1, 9). 24) _____

A) $y = -3x + 12$ B) $y = -6$ C) $y = -6x + 15$ D) $y = 6x + 3$

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

25) 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. 25) _____

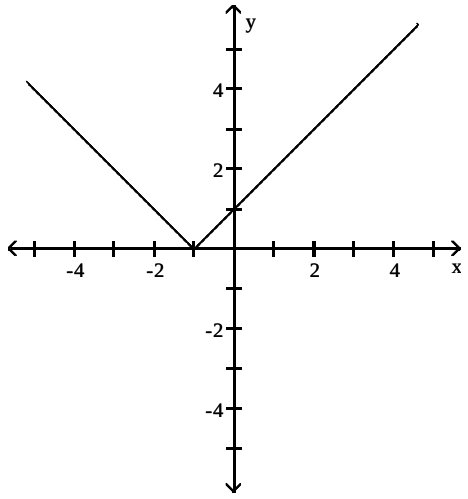
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

26) Find all points (x, y) on the graph of $f(x) = 2x^2 - 3x$ with tangent lines parallel to the line $y = 9x + 9$. 26) _____

A) (3, 18) B) (3, 9) C) (6, 9) D) (0, 0), (3, 9)

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?

27) $x = -1$ 27) _____



A) Differentiable

B) Continuous but not differentiable

C) Neither continuous nor differentiable

Find the value(s) of x for which the slope of the curve y = f(x) is 0.

28) $f(x) = \frac{x - x^2}{2x^2 + 6}$ 28) _____

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

Find the derivative.

29) $y = \frac{2}{\sin x} + \frac{1}{\cot x}$ 29) _____

A) $y' = -2 \csc x \cot x + \sec^2 x$ B) $y' = 2 \csc x \cot x - \sec^2 x$

C) $y' = 2 \cos x - \csc^2 x$ D) $y' = 2 \csc x \cot x - \csc^2 x$

30) $s = t^4 - \csc t + 5$ 30) _____

A) $\frac{ds}{dt} = 4t^3 - \csc t \cot t$ B) $\frac{ds}{dt} = 4t^3 + \csc t \cot t$

C) $\frac{ds}{dt} = 4t^3 + \cot^2 t$ D) $\frac{ds}{dt} = t^3 - \cot^2 t + 5$

31) $p = \frac{\sec q + \csc q}{\csc q}$ 31) _____

A) $\frac{dp}{dq} = \sec^2 q + 1$ B) $\frac{dp}{dq} = \sec^2 q$

C) $\frac{dp}{dq} = -\csc q \cot q$ D) $\frac{dp}{dq} = \sec q \tan q$

32) $r = 5 - \theta^7 \cos \theta$ 32) _____

A) $\frac{dr}{d\theta} = 7\theta^6 \sin \theta$ B) $\frac{dr}{d\theta} = 7\theta^6 \sin \theta - \theta^7 \cos \theta$

C) $\frac{dr}{d\theta} = 7\theta^6 \cos \theta - \theta^7 \sin \theta$ D) $\frac{dr}{d\theta} = -7\theta^6 \cos \theta + \theta^7 \sin \theta$

33) $s = 2t^2 + 7t + 4$ 33) _____

A) $4t^2 + 7$ B) $4t + 7$ C) $2t^2 + 7$ D) $2t + 7$

34) $y = \frac{10}{x} + 5 \sec x$ 34) _____

A) $y' = \frac{10}{x^2} - 5 \sec x \tan x$ B) $y' = -\frac{10}{x^2} - 5 \csc x$

C) $y' = -\frac{10}{x^2} + 5 \tan^2 x$ D) $y' = -\frac{10}{x^2} + 5 \sec x \tan x$

Solve the problem. Round your answer, if appropriate.

35) The volume of a rectangular box with a square base remains constant at 200 cm^3 as the area of the base increases at a rate of 12 cm^2/sec. Find the rate at which the height of the box is decreasing when each side of the base is 14 cm long. (Do not round your answer.) 35) _____

A) $\frac{150}{2401}$ cm/sec B) $\frac{300}{343}$ cm/sec C) $\frac{3}{49}$ cm/sec D) $\frac{50}{49}$ cm/sec

36) Water is discharged from a pipeline at a velocity v (in ft/sec) given by $v = 1804p^{(1/2)}$, where p is the pressure (in psi). If the water pressure is changing at a rate of 0.281 psi/sec, find the acceleration (dv/dt) of the water when p = 43.0 psi. 36) _____

A) 138 ft/sec^2 B) 38.7 ft/sec^2 C) 59.1 ft/sec^2 D) 1660 ft/sec^2

37) The radius of a right circular cylinder is increasing at the rate of 8 in./sec, while the height is decreasing at the rate of 10 in./sec. At what rate is the volume of the cylinder changing when the radius is 6 in. and the height is 18 in.? 37) _____

A) 504π in.^{3}/sec B) 504 in.^{3}/sec C) 1368π in.^{3}/sec D) -228 in.^{3}/sec

38) Water is being drained from a container which has the shape of an inverted right circular cone. The container has a radius of 5.00 inches at the top and a height of 6.00 inches. At the instant when the water in the container is 4.00 inches deep, the surface level is falling at a rate of 0.7 in./sec. Find the rate at which water is being drained from the container. 38) _____

A) 24.4 in.^{3}/s B) 22.0 in.^{3}s C) 27.7 in.^{3}/s D) 23.3 in.^{3}/s

39) A man 6 ft tall walks at a rate of 3 ft/sec away from a lamppost that is 23 ft high. At what rate is the length of his shadow changing when he is 45 ft away from the lamppost? (Do not round your answer) 39) _____

A) $\frac{45}{2}$ ft/sec B) $\frac{18}{17}$ ft/sec C) $\frac{9}{29}$ ft/sec D) $\frac{18}{29}$ ft/sec

Solve the problem.

40) A rock is thrown vertically upward from the surface of an airless planet. It reaches a height of $s = 120t - 5t^2$ meters in t seconds. How high does the rock go? How long does it take the rock to reach its highest point? 40) _____

A) 1440 m, 24 sec B) 2760 m, 24 sec C) 1428 m, 12 sec D) 720 m, 12 sec

41) Find the tangent to $y = \cos x$ at $x = \frac{\pi}{2}$. 41) _____

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

42) For a motorcycle traveling at speed v (in mph) when the brakes are applied, the distance d (in feet) required to stop the motorcycle may be approximated by the formula $d = 0.05v^2 + v$. Find the instantaneous rate of change of distance with respect to velocity when the speed is 41 mph. 42) _____

A) 4.1 mph B) 42 mph C) 5.1 mph D) 10.2 mph

43) 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 = 9 ft? 43) _____

A) 18π ft^2/ft B) 9π ft^2/ft C) 18 ft^2/ft D) 81π ft^2/ft

44) Assume that the profit generated by a product is given by $P(x) = 2\sqrt{x}$, where x is the number of units sold. If the profit keeps changing at a rate of $700 per month, then how fast are the sales changing when the number of units sold is 1200? (Round your answer to the nearest dollar per month.) 44) _____

A) $24,249/month B) $96,995/month C) $12,124/month D) $20/month

45) 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? 45) _____

A) No

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

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

D) Yes, at $x = \pi$

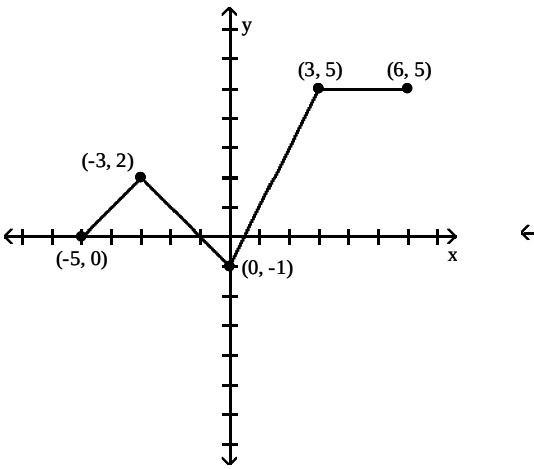
46) A wheel with radius 2 m rolls at 16 rad/s. How fast is a point on the rim of the wheel rising when the point is $\pi/3$ radians above the horizontal (and rising)? (Round your answer to one decimal place.) 46) _____

A) 8.0 m/s B) 64.0 m/s C) 16.0 m/s D) 32.0 m/s

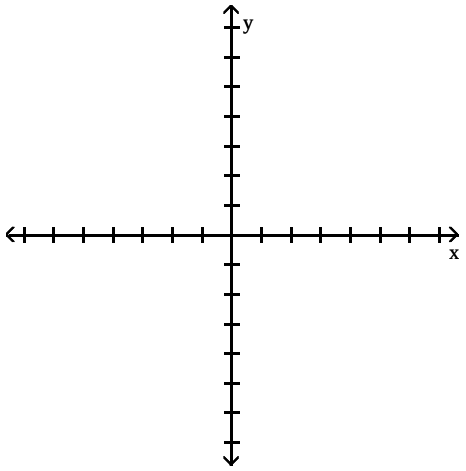
47) Suppose that the dollar cost of producing x radios is $c(x) = 400 + 20x - 0.2x^2$. Find the marginal cost when 40 radios are produced. 47) _____

A) -$880 B) $880 C) $36 D) $4

48) The graph of y = f(x) in the accompanying figure is made of line segments joined end to end. Graph the derivative of f. 48) _____



A)



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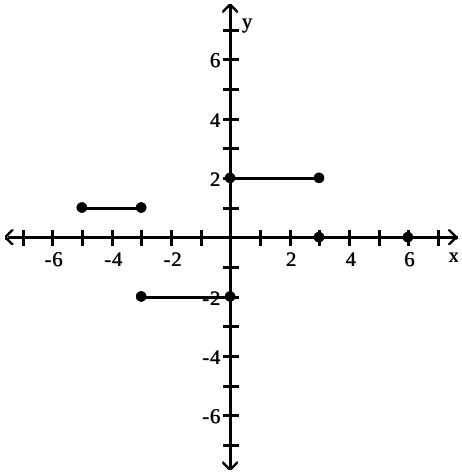

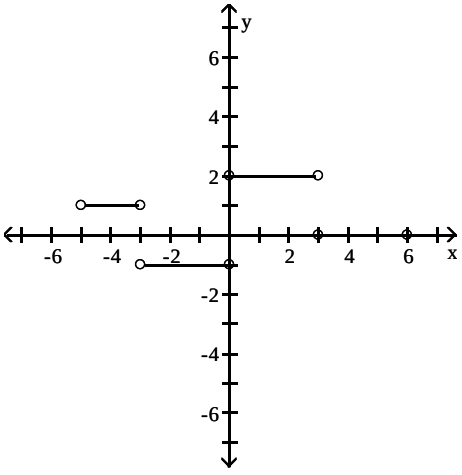

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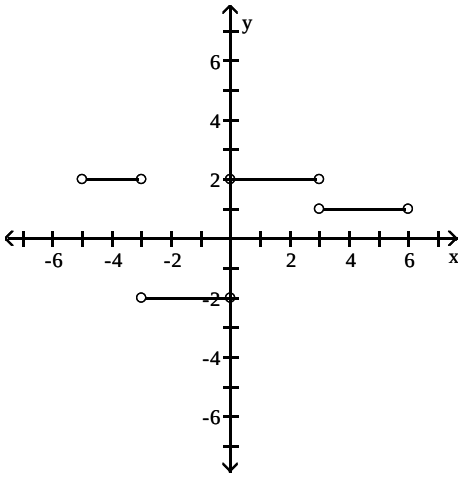
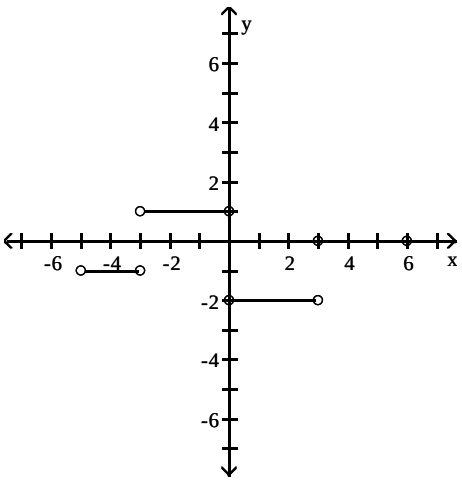


D)



49) 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 15 minutes? 49) _____

A) 1250 gal/min B) 250 gal/min C) 500 gal/min D) 625 gal/min

50) 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 4 m^2/s, then how fast are the people moving when they are 5 m from the right angle? (Round your answer to two decimal places.) 50) _____

A) 0.80 m/s B) 1.60 m/s C) 0.40 m/s D) 6.25 m/s

51) Find the tangent to $y = 2 - \sin x$ at $x = \pi$. 51) _____

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

Use implicit differentiation to find dy/dx.

52) $x = \sec(10y)$ 52) _____

A) $\cos(10y) \cot(10y)$ B) $\frac{1}{10} \sec(10y) \tan(10y)$

C) $\frac{1}{10} \cos(10y) \cot(10y)$ D) $10 \sec(10y) \tan(10y)$

53) $\frac{x + y}{x - y} = x^2 + y^2$ 53) _____

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

54) $2xy - y^2 = 1$ 54) _____

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

55) $x^4 = \cot y$ 55) _____

A) $-\frac{4x^3}{\csc y \cot y}$ B) $-\frac{4x^3}{\csc^2 y}$ C) $\frac{4x^3}{\csc^2 y}$ D) $\frac{\csc^2 y}{4x^3}$

56) $x^3 + 3x^2y + y^3 = 8$ 56) _____

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

57) $\cos xy + x^6 = y^6$ 57) _____

A) $\frac{6x^5 - y \sin xy}{6y^5 + x \sin xy}$ B) $\frac{6x^5 + x \sin xy}{6y^5}$ C) $\frac{6x^5 + y \sin xy}{6y^5 - x \sin xy}$ D) $\frac{6x^5 - x \sin xy}{6y^5}$

Find the second derivative.

58) $y = 7x^2 + 9x - 8$ 58) _____

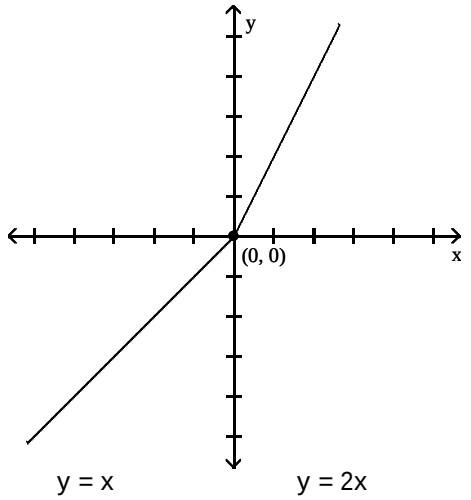
A) $14x + 9$ B) 0 C) 14 D) 7

59) $s = \frac{7t^3}{3} + 7$ 59) _____

A) $14t$ B) $14t + 7$ C) $7t$ D) $7t^2$

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

60) 60) _____



y = x y = 2x

A) Since $\lim_{x \to 0^+} f'(x) = -2$ while $\lim_{x \to 0^-} f'(x) = -1$, f(x) is not differentiable at x = 0.

B) Since $\lim_{x \to 0^+} f'(x) = 1$ while $\lim_{x \to 0^-} f'(x) = 2$, f(x) is not differentiable at x = 0.

C) Since $\lim_{x \to 0^+} f'(x) = 2$ while $\lim_{x \to 0^-} f'(x) = 1$, f(x) is not differentiable at x = 0.

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

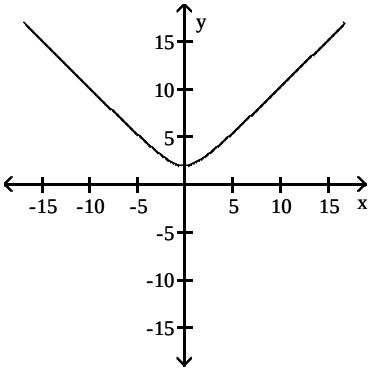
Estimate the slope of the curve at the indicated point.

61) 61) _____

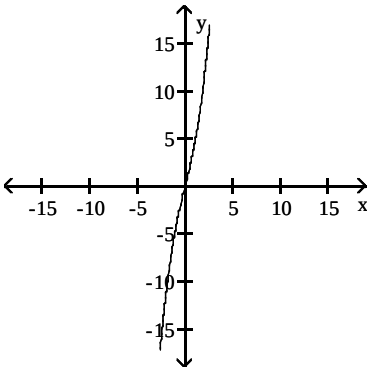
A) -1 B) 1 C) 0 D) Undefined

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

62) 62) _____



A)



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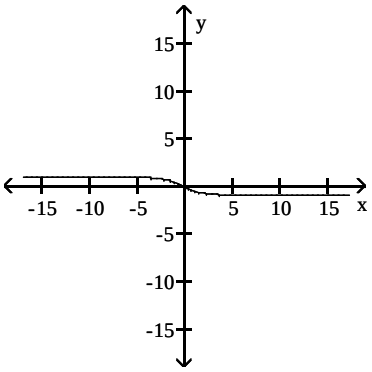

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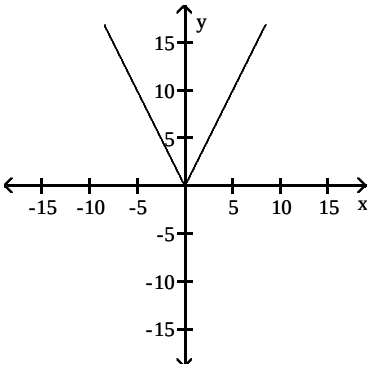
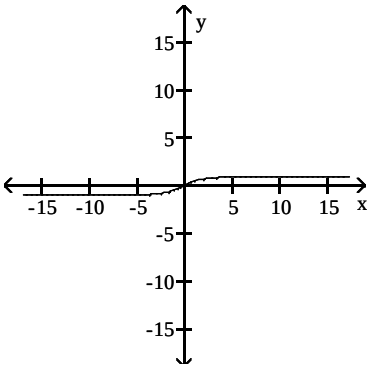


D)



Find dy/dt.

63) $y = \cos(\sqrt{8t + 11})$ 63) _____

A) $\frac{4}{\sqrt{8t + 11}} \sin(\sqrt{8t + 11})$

B) $-\sin\left(\frac{4}{\sqrt{8t + 11}}\right)$

C) $-\sin(\sqrt{8t + 11})$

D) $-\frac{1}{2\sqrt{8t + 11}} \sin(\sqrt{8t + 11})$

64) $y = t^4(t^5 - 9)^5$ 64) _____

A) $t^4(t^5 - 9)^4(29t^4 - 36)$

B) $100t^{18}(t^5 - 9)^4$

C) $4t^3(t^5 - 9)^4(25t^5 - 9)$

D) $t^3(t^5 - 9)^4(29t^5 - 36)$

65) $y = \cos^7(\pi t - 16)$ 65) _____

A) $-7\pi \sin^6(\pi t - 16)$

B) $-7 \cos^6(\pi t - 16) \sin(\pi t - 16)$

C) $7 \cos^6(\pi t - 16)$

D) $-7\pi \cos^6(\pi t - 16) \sin(\pi t - 16)$

Find the slope of the line tangent tangent to the graph a the given point using the limit process.

66) $y = \frac{6}{3 + x}$, $x = 7$ 66) _____

A) $m = \frac{3}{50}$ B) $m = -\frac{3}{50}$ C) $m = \frac{3}{5}$ D) $m = -\frac{3}{5}$

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

67) $x^4y^4 = 16$, tangent at (2, 1) 67) _____

A) $y = -8x + 1$ B) $y = -\frac{1}{2}x + 2$ C) $y = 8x - 1$ D) $y = \frac{1}{2}x$

68) $y^6 + x^3 = y^2 + 10x$, slope at (0, 1) 68) _____

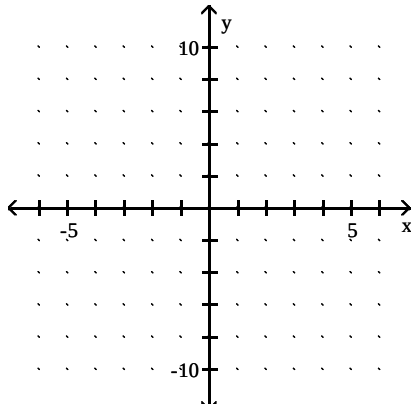
A) $\frac{5}{2}$ B) $\frac{5}{4}$ C) -2 D) $\frac{5}{3}$

69) $3x^2y - \pi \cos y = 4\pi$, slope at $(1, \pi)$ 69) _____

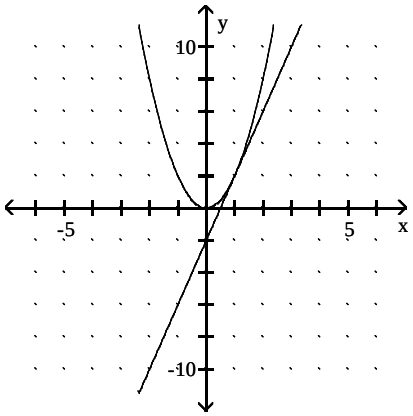
A) 0 B) π C) $-\frac{\pi}{2}$ D) -2π

Graph the equation and its tangent.

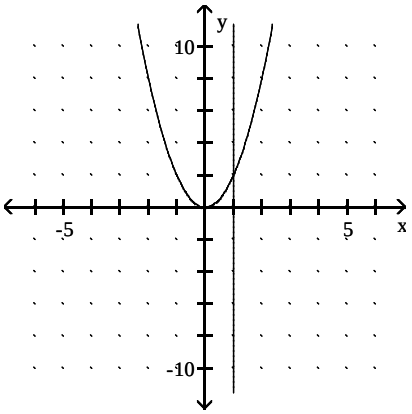
70) Graph $y = 2x^2$ and the tangent to the curve at the point whose x-coordinate is 1. 70) _____



A)



B)



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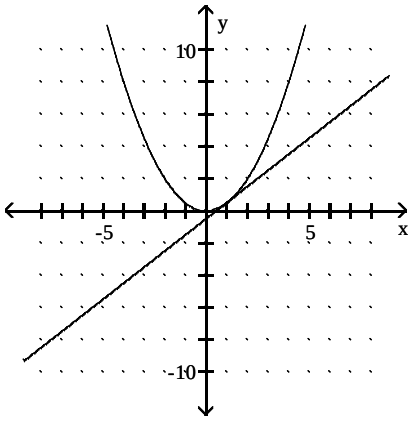
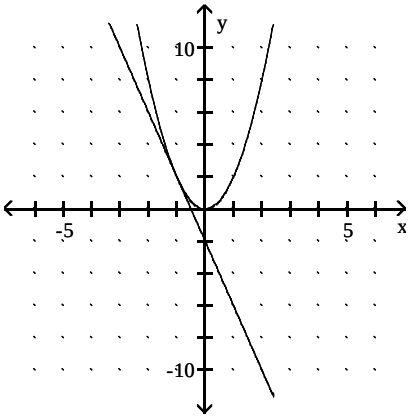
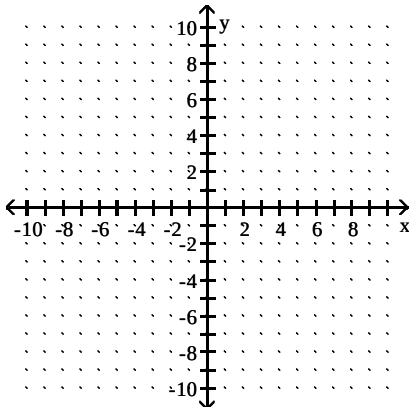


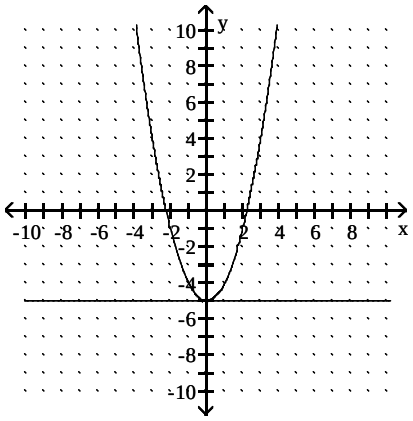
D)



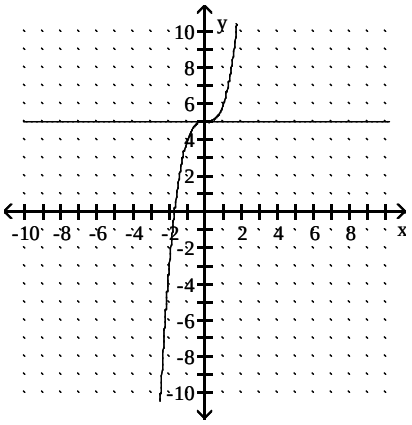
71) Graph $y = x^3 + 5$ and the tangent to the curve at the point whose x-coordinate is 0. 71) _____



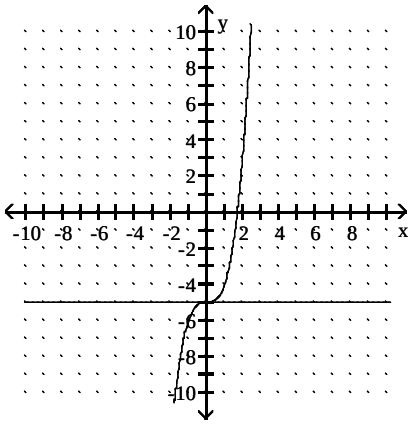
A)



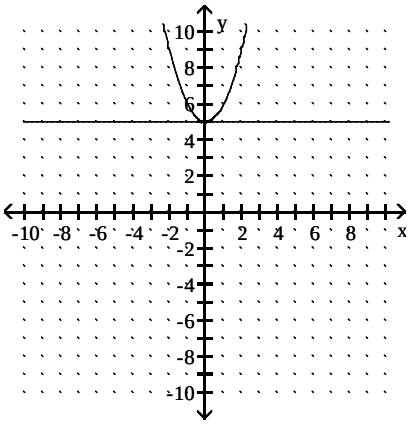
B)



C)



D)



Find $\frac{d^2y}{dx^2}$ for the given function.

72) $y = \left(10 + \frac{4}{x}\right)^4$ 72) _____

A) $-\frac{48}{x^2}\left(10 + \frac{4}{x}\right)^2 + \frac{32}{x^3}\left(10 + \frac{4}{x}\right)^3$

B) $12\left(10 + \frac{4}{x}\right)^2$

C) $\frac{192}{x^4}\left(10 + \frac{4}{x}\right)^2 + \frac{32}{x^3}\left(10 + \frac{4}{x}\right)^3$

D) $-\frac{16}{x^2}\left(10 + \frac{4}{x}\right)^3$

73) $y = 5\sin(2x + 7)$ 73) _____

A) $-10\sin(2x + 7)$ B) $-20\sin(2x + 7)$ C) $-20\cos(2x + 7)$ D) $10\cos(2x + 7)$

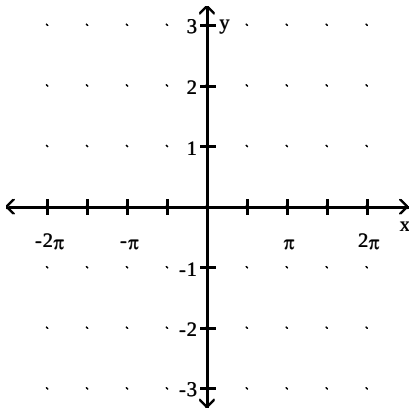
Find the second derivative of the function.

74) $y = \frac{x^4 + 7}{x^2}$ 74) _____

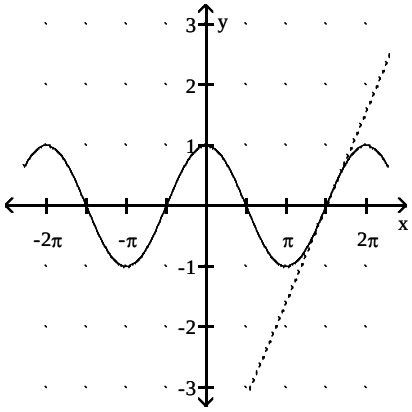
A) $\frac{d^2y}{dx^2} = 1 + \frac{42}{x^4}$ B) $\frac{d^2y}{dx^2} = 2 - \frac{42}{x^4}$ C) $\frac{d^2y}{dx^2} = 2 + \frac{42}{x^4}$ D) $\frac{d^2y}{dx^2} = 2x - \frac{14}{x^3}$

Graph the curve over the given interval together with its tangent at the given value of x. Graph the tangent with a dashed line.

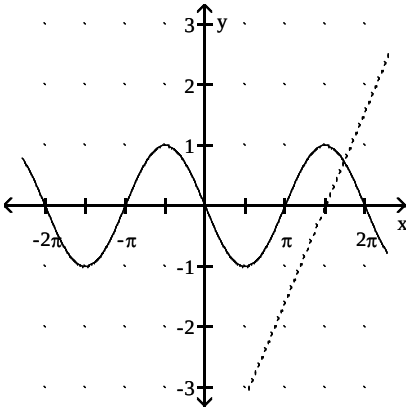
75) $y = \cos(x)$, $-2\pi \le x \le 2\pi$, $x = \frac{3\pi}{2}$ 75) _____



A)



B)



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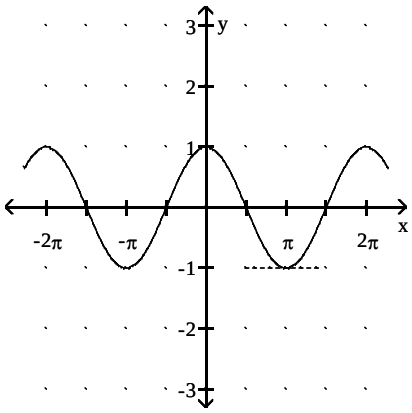
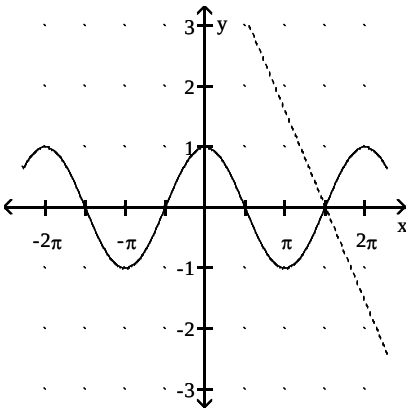


D)



At the given point, find the line that is normal to the curve at the given point.

76) $3x^2y - \pi \cos y = 4\pi$, normal at $(1, \pi)$ 76) _____

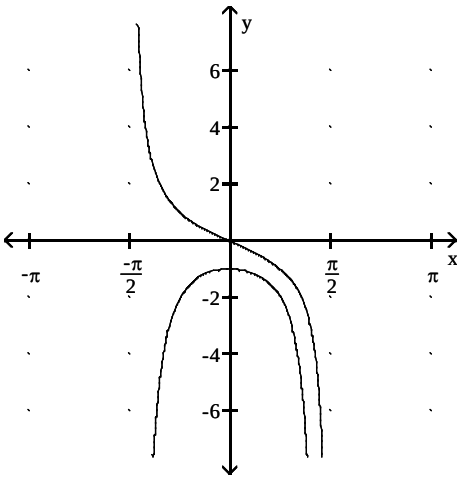
A) $y = \frac{1}{2\pi}x - \frac{1}{2\pi} + \pi$

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

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

D) $y = \frac{1}{\pi}x - \frac{1}{\pi} + \pi$

1) C
2) D
3) A
4) D
5) A
6) C
7) B
8) B
9) C
10) C
11) D
12) A
13) A
14) D
15) B
16) C
17) D
18) A
19) B
20) D
21) D
22) A
23) B
24) C
25)



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.

26) B
27) B
28) C
29) A
30) B
31) B
32) D
33) B

34) D
35) A
36) B
37) C
38) A
39) B
40) D
41) A
42) C
43) A
44) A
45) B
46) C
47) D
48) B
49) C
50) A
51) A
52) C
53) D
54) B
55) B
56) B
57) A
58) C
59) A
60) C
61) C
62) D
63) A
64) D
65) D
66) B
67) B
68) A
69) D
70) A
71) B
72) C
73) B
74) C
75) A
76) A