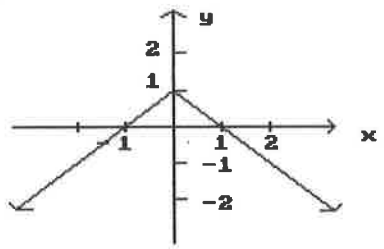
# Chapter 2 Test Review 2.1 to 2.6

Name_____

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

**Find the values where the function is not differentiable.**

1) 1) _____




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

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

2) $f(x) = 7 + \sin x, \quad [-\pi, \pi]$ 2) _____

A) $-\frac{2}{\pi} \approx -0.637$ B) $\frac{7}{\pi} \approx 2.228$ C) 0 D) $\frac{1}{\pi} \approx 0.318$

**If the function is not differentiable at the given value of x, tell whether the problem is a corner, cusp, vertical tangent, or a discontinuity.**

3) $y = -3|x| - 9$, at $x = 0$ 3) _____

A) cusp
B) corner
C) vertical tangent
D) function is differentiable at $x = 0$

4) $y = \frac{8}{x+2}$, at $x = -2$ 4) _____

A) cusp
B) discontinuity
C) corner
D) function is differentiable at $x = -2$

5) $y = 3 - \sqrt[3]{x}$, at $x = 0$ 5) _____

A) discontinuity
B) cusp
C) vertical tangent
D) function is differentiable at $x = 0$

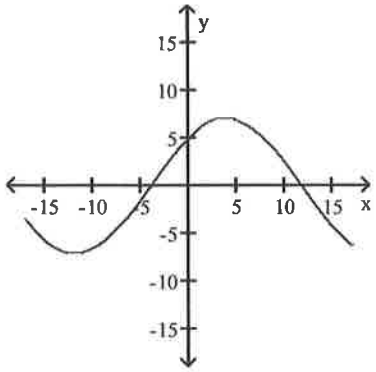
**Find dy/dx.**

6) $y = 10x^{-2} + 8x^3 - 6x$ 6) _____

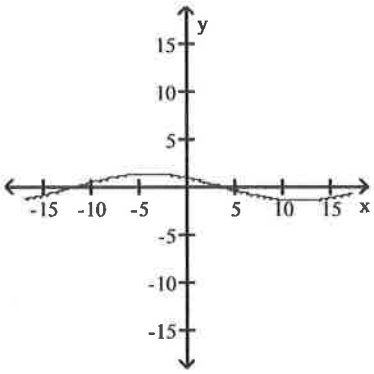
A) $-20x^{-3} + 24x^2 - 6$
B) $-20x^{-3} + 24x^2$
C) $-20x^{-1} + 24x^2$
D) $-20x^{-1} + 24x^2 - 6$

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

7) 7) _____




A)

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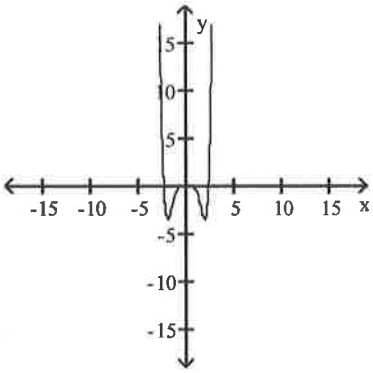


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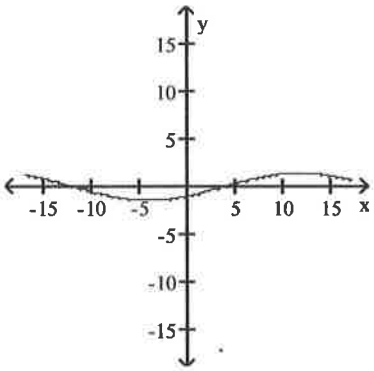
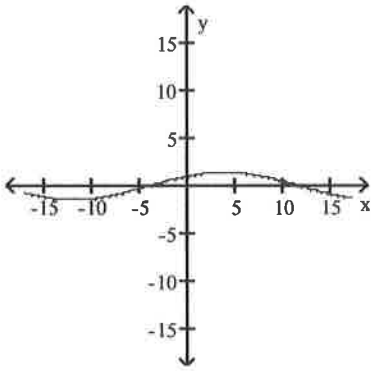



D)




**Solve the problem.**

8) Find an equation of the tangent line to the graph of $y = 2\sqrt{x} - x + 7$ at the point $(4, 7)$. 8) _____

A) $y = -\frac{1}{2}x + 9$ B) $y = \frac{1}{2}x - 9$ C) $y = 7$ D) $y = -\frac{1}{2}x + 7$

9) Find the equation of the normal line to the curve $y = 3x - 5x^2$ at the point $(-3, -54)$. 9) _____

A) $x - 27y + 1785 = 0$ B) $x + 33y + 975 = 0$

C) $x - 27y + 975 = 0$ D) $x + 33y + 1785 = 0$

10) Find the points where the graph of the function has horizontal tangents. 10) _____

$f(x) = 4x^2 + 4x - 4$

A) $\left(\frac{1}{2}, -18\right)$ B) (0, 4) C) $\left(-\frac{1}{2}, -5\right)$ D) (-12, 716)

11) 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 42 mph. 11) _____

A) 10.4 mph B) 5.2 mph C) 4.2 mph D) 43 mph

12) Assume that a watermelon dropped from a tall building falls $y = 16t^2$ ft in t sec. Find the watermelon's average speed during the first 4 sec of fall and the speed at the instant t = 4 sec. 12) _____

A) 65 ft/sec; 130 ft/sec B) 32 ft/sec; 64 ft/sec
C) 128 ft/sec; 65 ft/sec D) 64 ft/sec; 128 ft/sec

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

13) $f(x) = \begin{cases} 4 + x & x \le 6 \\ -x - 3 & x > 6 \end{cases}$ at $x = 6$ 13) _____

A) -1 B) 0 C) Does not exist D) 1

**Find dy/dx.**

14) $y = \dfrac{7x^2 + x - 1}{x^3 - 6x^2}$ 14) _____

A) $\dfrac{-7x^4 - 2x^3 + 9x^2 - 12x}{(x^3 - 6x^2)^2}$ B) $\dfrac{35x^4 - 2x^3 + 9x^2 - 12x}{x^3 - 6x^2}$

C) $\dfrac{35x^4 - 168x^3 + 9x^2 - 12x}{(x^3 - 6x^2)^2}$ D) $\dfrac{-7x^4 - 3x^3 + 15x^2 - 12x}{(x^3 - 6x^2)^2}$

**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.**

15) $u(2) = 6$, $u'(2) = 4$, $v(2) = -3$, $v'(2) = -5$. 15) _____

$\dfrac{d}{dx}(uv)$ at $x = 2$

A) -18 B) 42 C) 39 D) -42

16) $u(1) = 5$, $u'(1) = -5$, $v(1) = 6$, $v'(1) = -2$. 16) _____

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

A) 4 B) $-\frac{4}{5}$ C) $-\frac{8}{5}$ D) $\frac{4}{5}$

**Solve the problem.**

17) The function $V = s^3$ describes the volume of a cube, V, in cubic inches, whose length, width, and height each measure s inches. Find the (instantaneous) rate of change of the volume with respect to s when s = 3 inches. 17) _____

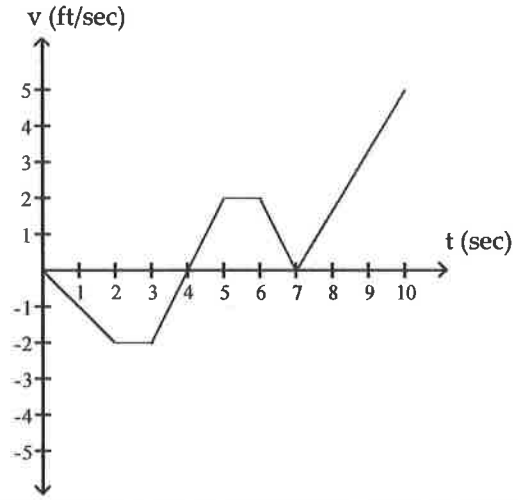
A) 27 $in^3$/in. B) 27.91 $in^3$/in. C) 9 $in^3$/in. D) 81 $in^3$/in.

18) The dollar cost to produce x handcrafted wagons is $C(x) = 60 + 8x - x^2 + 6x^3$. Find the marginal cost when $x = 2$. 18) _____

A) \$60 B) \$76 C) \$136 D) \$120

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

19) 19) _____




When is the body's acceleration equal to zero?

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

C) $2 < t < 3, 5 < t < 6$ D) $t = 0, t = 4, t = 7$

**Solve the problem.**

20) At time t, the position of a body moving along the s-axis is $s = t^3 - 27t^2 + 240t$ m. Find the body's acceleration each time the velocity is zero. 20) _____

A) $a(10) = -6$ m/sec$^2$, $a(8) = 6$ m/sec$^2$ B) $a(10) = 0$ m/sec$^2$, $a(8) = 0$ m/sec$^2$

C) $a(10) = 6$ m/sec$^2$, $a(8) = -6$ m/sec$^2$ D) $a(20) = 120$ m/sec$^2$, $a(16) = 20$ m/sec$^2$

**Find dy/dx.**

21) $s = t^3 \tan t$ 21) _____

A) $-t^3 \sec^2 t + 3t^2 \tan t$ B) $3t^2 \sec^2 t$

C) $t^3 \sec^2 t + 3t^2 \tan t$ D) $t^3 \sec t \tan t + 3t^2 \tan t$

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

22) $s = -3 + 7 \cos t$ 22) _____

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

A) $\frac{7}{2}$ m/sec$^2$ B) $-\frac{7\sqrt{3}}{2}$ m/sec$^2$ C) $-\frac{7}{2}$ m/sec$^2$ D) $\frac{7\sqrt{3}}{2}$ m/sec$^2$

**Use the given substitution and the Chain Rule to find dy/dx.**

23) $y = \cot u$; $u = 7x - 9$ 23) _____

A) $-\csc^2(7x - 9)$ B) $-7 \cot(7x - 9) \csc(7x - 9)$

C) $-7 \csc^2(7x - 9)$ D) $-7 \cot x \csc^2 x$

**Find dy/dx.**

24) $y = \sqrt{4 + \sin 10x}$ 24) _____

A) $\dfrac{5}{\sqrt{4 + \cos 10x}}$

B) $\dfrac{5 \cos 10x}{\sqrt{4 + \sin 10x}}$

C) $\sqrt{10 \cos 10x}$

D) $5 \cos 10x \sqrt{4 + \sin 10x}$

**Find y ″.**

25) $y = 6 \sin(2x + 10)$ 25) _____

A) $-12 \sin(2x + 10)$

B) $12 \cos(2x + 10)$

C) $-24 \sin(2x + 10)$

D) $-24 \cos(2x + 10)$

**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.**

26) 26) _____

| x | f(x) | g(x) | f ′(x) | g ′(x) |
|---|---|---|---|---|
| 3 | 1 | 4 | 8 | 7 |
| 4 | -3 | 3 | 5 | -4 |

f(g(x)) at x = 4

A) 8

B) 24

C) -20

D) -32

**Solve the problem.**

27) 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. 27) _____

A) $-\dfrac{1}{16}$ m/sec$^2$

B) $\dfrac{1}{2}$ m/sec$^2$

C) $-\dfrac{1}{8}$ m/sec$^2$

D) $\dfrac{1}{8}$ m/sec$^2$

**Find dy/dx by implicit differentiation. If applicable, express the result in terms of x and y.**

28) $5y - 2x^2 = x - 3$ 28) _____

A) $\dfrac{4x - 2}{5}$

B) $\dfrac{4}{5}x$

C) $\dfrac{1 + 2x^2}{5}$

D) $\dfrac{1 + 4x}{5}$

29) $2y + 9xy - 4 = 0$ 29) _____

A) $\dfrac{-9y}{2 + 9x}$

B) $\dfrac{-9y(x + 1)}{2}$

C) $\dfrac{-9y}{2 + 9xy}$

D) $\dfrac{-9(x + y)}{2}$

**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.**

30) $3x^2y - \pi \cos y = 4\pi$, tangent at $(1, \pi)$ 30) _____

A) $y = \pi x$

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

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

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

31) $x^2 - y^2 = 15$, normal at $(-8, 7)$ 31) _____

A) $7x - 8y - 112 = 0$

B) $7x + 8y - 112 = 0$

C) $7x + 8y + 112 = 0$

D) $7x - 8y + 112 = 0$

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

32) $xy - x + y = 3$ 32) _____

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

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

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

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

**Find dy/dx.**

33) $y = \sqrt{8 + \sin(6x)}$ 33) _____

A) $\frac{dy}{dx} = \frac{3\cos(6x)}{\sqrt{8 + \sin(6x)}}$

B) $\frac{dy}{dx} = \frac{\cos(6\theta)}{(8 + \sin(6x))^{3/2}}$

C) $\frac{dy}{dx} = \frac{1}{2\sqrt{8 + \sin(6x)}}$

D) $\frac{dy}{dx} = \frac{\cos(6x)}{2\sqrt{8 + \sin(6x)}}$