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

Find the limit.

1) Let $\lim_{x \to -8} f(x) = -3$ and $\lim_{x \to -8} g(x) = -1$. Find $\lim_{x \to -8} [f(x) + g(x)]^2$. 1) _____

A) -2 B) 16 C) -4 D) 10

Find y''.

2) $y = \sqrt{7x + 7}$ 2) _____

A) $-\dfrac{1}{4(7x + 7)^{3/2}}$ B) $-\dfrac{49}{4(7x + 7)^{3/2}}$ C) $\dfrac{7}{2\sqrt{7x + 7}}$ D) $-\dfrac{49\sqrt{7x + 7}}{4}$

3) $y = 5 \sin(4x + 11)$ 3) _____

A) $-80 \sin(4x + 11)$ B) $-80 \cos(4x + 11)$

C) $20 \cos(4x + 11)$ D) $-20 \sin(4x + 11)$

Determine the values of x for which the function is differentiable.

4) $y = \sqrt{x + 9}$ 4) _____

A) All reals except -9 B) All reals greater than -9

C) All reals greater than 9 D) All reals greater than or equal to -9

Solve the problem.

5) 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. 5) _____

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

6) 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. 6) _____

A) $a(12) = 72$ m/sec^2, $a(8) = 12$ m/sec^2 B) $a(6) = 0$ m/sec^2, $a(4) = 0$ m/sec^2

C) $a(6) = -6$ m/sec^2, $a(4) = 6$ m/sec^2 D) $a(6) = 6$ m/sec^2, $a(4) = -6$ m/sec^2

7) Assume that a watermelon dropped from a tall building falls $y = 16t^2$ ft in t sec. Find the watermelon's speed at the instant $t = 4$ sec. 7) _____

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

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

8) $2x^2y - \pi \cos y = 3\pi$, tangent at $(1, \pi)$ 8) _____

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

9) $4x^2y - \pi \cos y = 5\pi$, normal at $(1, \pi)$ 9) _____

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

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

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

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

Find dy/dx.

10) $y = 9xe^x - 9e^x$ 10) _____

A) $9x$ B) $9xe^x$ C) $9xe^x + 18e^x$ D) $9e^x$

11) $y = \log(9x - 8)$ 11) _____

A) $\frac{9}{(9x - 8)\ln 10}$ B) $\frac{1}{(9x - 8)\ln 10}$ C) $\frac{9x - 8}{9 \ln 10}$ D) $\frac{9}{\ln 10}$

12) $y = (7 - 5x^2)(3x^2 - 60)$ 12) _____

A) $15x^3 + 321x$ B) $-60x^4 + 642x^2$ C) $-60x^3 + 642$ D) $-60x^3 + 642x$

13) $y = \ln(\ln 9x)$ 13) _____

A) $\frac{1}{9x}$ B) $\frac{1}{x \ln 9x}$ C) $\frac{1}{\ln 9x}$ D) $\frac{1}{x}$

14) $y = \frac{7x - 3}{8x^2 + 1}$ 14) _____

A) $\frac{168x^2 - 48x + 7}{(8x^2 + 1)^2}$

B) $\frac{-56x^2 + 41x + 10}{(8x^2 + 1)^2}$

C) $\frac{56x^3 - 112x^2 + 55x}{(8x^2 + 1)^2}$

D) $\frac{-56x^2 + 48x + 7}{(8x^2 + 1)^2}$

15) $y = \frac{\sqrt{x} - 8}{\sqrt{x} + 8}$ 15) _____

A) $-\frac{8}{\sqrt{x}(\sqrt{x} + 8)^2}$ B) $\frac{8}{x + 8}$ C) $\frac{8}{\sqrt{x}(\sqrt{x} + 8)^2}$ D) $\frac{16}{(x + 8)\sqrt{x - 64}}$

16) $y = 3 \sec^2 x$ 16) _____

A) $6 \tan^2 x \sec^2 x$ B) $6 \tan^2 x \sec^1 x$ C) $6 \sec^1 x$ D) $6 \tan x \sec^2 x$

17) $y = 19^{-x}$ 17) _____

A) $-\ln 19 (19^{-x})$ B) -19^{-x} C) $\ln 19 (19^{-x})$ D) 19^{-x}

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.

18) $u(2) = 8$, $u'(2) = 3$, $v(2) = -3$, $v'(2) = -4$. 18) _____

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

A) 41 B) 36 C) −41 D) −23

Give the exact value.

19) $\sec\frac{\pi}{6}$ 19) _____

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

Find the horizontal tangents of the curve.

20) $y = x^4 - 32x^2 - 1$ 20) _____

A) At $x = 0$ B) At $x = 4, -4,$ C) At $x = 0, 4, -4$ D) At $x = 0,\ 4$

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

21) $f(u) = \frac{1}{u}$, $u = g(x) = 4x - x^2$, $x = 1$ 21) _____

A) $\frac{2}{9}$ B) $-\frac{1}{2}$ C) $\frac{1}{2}$ D) $-\frac{2}{9}$

Determine the limit by substitution.

22) $\lim\limits_{x\to 4} \frac{x^2 + 16}{x + 4}$ 22) _____

A) 0 B) 4 C) Does not exist D) 8

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

23) $\cos xy + x^5 = y^5$ 23) _____

A) $\frac{5x^4 - x \sin xy}{5y^4}$ B) $\frac{5x^4 + x \sin xy}{5y^4}$ C) $\frac{5x^4 + y \sin xy}{5y^4 - x \sin xy}$ D) $\frac{5x^4 - y \sin xy}{5y^4 + x \sin xy}$

Determine the limit algebraically, if it exists.

24) $\lim\limits_{x\to 2} \frac{x^2 + 7x - 18}{x - 2}$ 24) _____

A) 11 B) Does not exist C) 0 D) 7

25) $\lim\limits_{x\to 0} \frac{\frac{1}{x+2} - \frac{1}{2}}{x}$ 25) _____

A) $\frac{1}{4}$ B) Does not exist C) $-\frac{1}{4}$ D) 0

Find the extreme values of the function and where they occur.

26) $y = \dfrac{x + 1}{x^2 + 3x + 3}$ 26) _____

A) The maximum is $-\dfrac{1}{3}$ at $x = 0$; the minimum is 1 at $x = -2$.

B) The maximum is 3 at $x = 0$; the minimum is $\dfrac{1}{3}$ at $x = -2$.

C) The maximum is $\dfrac{1}{3}$ at $x = 0$; the minimum is -1 at $x = -2$.

D) There are none.

Find the indicated limit.

27) $\lim\limits_{x \to 0^+} \dfrac{10x}{|x|}$ 27) _____

A) 10 B) -10 C) 0 D) Does not exist

Find the derivative of the given function.

28) $y = \tan^{-1} \sqrt{5x}$ 28) _____

A) $\dfrac{1}{10\sqrt{5x(1 + 5x)}}$ B) $\dfrac{1}{\sqrt{1 - 5x}}$ C) $\dfrac{5}{2(1 + 5x)\sqrt{5x}}$ D) $\dfrac{1}{1 + 5x}$

29) $y = \dfrac{1}{\sin^{-1} 4x}$ 29) _____

A) $\dfrac{-1}{(\sin^{-1} 4x)^2}$ B) $\dfrac{-4}{\sqrt{1 - 16x^2}\,(\sin^{-1} 4x)^2}$

C) $\dfrac{\sqrt{1 - 16x^2}}{4}$ D) $\dfrac{-4}{\sqrt{1 - 16x^2}}$

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.

30)

x	f(x)	g(x)	f ′(x)	g ′(x)
3	1	16	8	7
4	−3	3	5	−4

30) _____

$\sqrt{f(x) + g(x)}$ at $x = 3$

A) $-\dfrac{1}{2\sqrt{17}}$ B) $\dfrac{15}{2\sqrt{17}}$ C) $\dfrac{15}{\sqrt{17}}$ D) $\dfrac{1}{2\sqrt{17}}$

Use logarithmic differentiation to find dy/dx.

31) $y = (\cos x)^x$ 31) _____

A) $(\cos x)^x (\ln \cos x + x \cot x)$ B) $(\cos x)^x (\ln \cos x - x \tan x)$

C) $\ln \cos x - x \tan x$ D) $\ln x(\cos x)^x - 1$

Find the extreme values of the function on the interval and where they occur.

32) $F(x) = \sqrt[3]{x}$; $-3 \le x \le 64$ 32) _____

A) Maximum at (−64, 4), and minimum at (0, 0)

B) Maximum at (64, 4), and minimum at $(-3, \sqrt[3]{-3})$

C) Maximum at (64, 4), and minimum at (−64, −4)

D) Maximum at (0 , 0), and minimum at (64, 4)

Find the indicated derivative.

33) Find y'' if $y = 3x \sin x$. 33) _____

A) $y'' = -6 \cos x + 3x \sin x$

B) $y'' = -3x \sin x$

C) $y'' = 6 \cos x - 3x \sin x$

D) $y'' = 3 \cos x - 6x \sin x$