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

Determine the limit algebraically, if it exists.

1) $\lim_{x \rightarrow 0} \frac{\frac{1}{x+8} - \frac{1}{8}}{x}$ 1) _____

- A) Does not exist B) 0 C) $-\frac{1}{64}$ D) $\frac{1}{64}$

2) $\lim_{x \rightarrow 6} \frac{x^2 + 2x - 48}{x - 6}$ 2) _____

- A) Does not exist B) 14 C) 0 D) 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.

3) $u(2) = 10, u'(2) = 3, v(2) = -2, v'(2) = -4.$ 3) _____

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

- A) 38 B) -34 C) 46 D) -46

Find dy/dx.

4) $y = \frac{x^2}{9 - 8x}$ 4) _____

- A) $\frac{8x^3 - 16x^2 + 18x}{(9 - 8x)^2}$ B) $\frac{9x}{(9 - 8x)^2}$
C) $\frac{-8x^2 + 18x}{(9 - 8x)^2}$ D) $\frac{-24x^2 + 18x}{(9 - 8x)^2}$

5) $y = \frac{3x - 4}{9x^2 + 6}$ 5) _____

- A) $\frac{27x^3 - 54x^2 + 90x}{(9x^2 + 6)^2}$ B) $\frac{-27x^2 + 72x + 18}{(9x^2 + 6)^2}$
C) $\frac{81x^2 - 72x + 18}{(9x^2 + 6)^2}$ D) $\frac{-27x^2 + 54x + 42}{(9x^2 + 6)^2}$

6) $y = 3 \sec^2 x$ 6) _____

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

7) $y = \frac{\sqrt{x} - 5}{\sqrt{x} + 5}$ 7) _____

- A) $\frac{5}{\sqrt{x}(\sqrt{x} + 5)^2}$ B) $-\frac{5}{\sqrt{x}(\sqrt{x} + 5)^2}$ C) $\frac{10}{(x + 5)\sqrt{x} - 25}$ D) $\frac{5}{x + 5}$

8) $y = (3x - 5)(5x^3 - x^2 + 1)$ 8) _____

- A) $15x^3 + 28x^2 - 84x + 3$ B) $60x^3 - 84x^2 + 10x + 3$
 C) $45x^3 + 84x^2 - 28x + 3$ D) $60x^3 - 28x^2 + 84x + 3$

9) $y = 5xe^x - 5e^x$ 9) _____

- A) $5e^x$ B) $5xe^x + 10e^x$ C) $5x$ D) $5xe^x$

Solve the problem.

10) At time t , the position of a body moving along the s -axis is $s = t^3 - 21t^2 + 120t$ m. Find the body's acceleration each time the velocity is zero. 10) _____

- A) $a(10) = -18 \text{ m/sec}^2$, $a(4) = 18 \text{ m/sec}^2$ B) $a(10) = 18 \text{ m/sec}^2$, $a(4) = -18 \text{ m/sec}^2$
 C) $a(10) = 0 \text{ m/sec}^2$, $a(4) = 0 \text{ m/sec}^2$ D) $a(20) = 120 \text{ m/sec}^2$, $a(8) = 20 \text{ m/sec}^2$

11) 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. 11) _____

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

Determine the limit by substitution.

12) $\lim_{x \rightarrow 5} \frac{x^2 + 25}{x + 5}$ 12) _____

- A) 5 B) Does not exist C) 0 D) 10

Find the limit, if it exists.

13) $\lim_{x \rightarrow -\infty} \frac{2x^3 + 3x^2}{x - 7x^2}$ 13) _____

- A) 2 B) $-\infty$ C) ∞ D) $-\frac{3}{7}$

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 .

14)

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
3	1	9	6	3
4	3	3	2	-6

 14) _____

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

- A) $\frac{9}{2\sqrt{10}}$ B) $\frac{9}{\sqrt{10}}$ C) $\frac{1}{2\sqrt{10}}$ D) $-\frac{1}{2\sqrt{10}}$

Find the derivative of the given function.

15) $y = \tan^{-1} \sqrt{7x}$

A) $\frac{1}{14\sqrt{7x}(1+7x)}$

B) $\frac{1}{\sqrt{1-7x}}$

C) $\frac{1}{1+7x}$

D) $\frac{7}{2(1+7x)\sqrt{7x}}$

15) _____

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

A) $\frac{-3}{\sqrt{1-9x^2} (\sin^{-1} 3x)^2}$

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

C) $\frac{\sqrt{1-9x^2}}{3}$

D) $\frac{-3}{\sqrt{1-9x^2}}$

16) _____

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

17) $\cos xy + x^4 = y^4$

A) $\frac{4x^3 - y \sin xy}{4y^3 + x \sin xy}$

B) $\frac{4x^3 + y \sin xy}{4y^3 - x \sin xy}$

C) $\frac{4x^3 - x \sin xy}{4y^3}$

D) $\frac{4x^3 + x \sin xy}{4y^3}$

17) _____

Find the horizontal tangents of the curve.

18) $y = x^4 - 18x^2 - 4$

A) At $x = 3, -3$,

B) At $x = 0, 3$

C) At $x = 0, 3, -3$

D) At $x = 0$

18) _____

Find dy/dx .

19) $y = 25^{-x}$

A) 25^{-x}

B) $-\ln 25 (25^{-x})$

C) -25^{-x}

D) $\ln 25 (25^{-x})$

19) _____

Find y'' .

20) $y = 2 \cot \left(\frac{x}{9} \right)$

A) $-\frac{2}{9} \csc^2 \left(\frac{x}{9} \right)$

B) $\frac{4}{81} \csc^2 \left(\frac{x}{9} \right) \cot \left(\frac{x}{9} \right)$

C) $4 \csc^2 \left(\frac{x}{9} \right) \cot \left(\frac{x}{9} \right)$

D) $-4 \csc \left(\frac{x}{9} \right)$

20) _____

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

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

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

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

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

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

21) _____

Find the indicated limit.

22) $\lim_{x \rightarrow 0^+} \frac{11x}{|x|}$

A) Does not exist

B) -11

C) 11

D) 0

22) _____

Find the limit.

23) Let $\lim_{x \rightarrow -10} f(x) = -5$ and $\lim_{x \rightarrow -10} g(x) = -3$. Find $\lim_{x \rightarrow -10} [f(x) + g(x)]^2$.

23) _____

A) 64

B) 34

C) -8

D) -2