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

Find dy/dx .

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

A) $\frac{36x^2 - 72x + 6}{(6x^2 + 3)^2}$

B) $\frac{-12x^2 + 72x + 6}{(6x^2 + 3)^2}$

C) $\frac{-12x^2 + 66x + 24}{(6x^2 + 3)^2}$

D) $\frac{12x^3 - 24x^2 + 78x}{(6x^2 + 3)^2}$

2) $y = \ln(\ln 7x)$ 2) _____

A) $\frac{1}{7x}$

B) $\frac{1}{x \ln 7x}$

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

D) $\frac{1}{\ln 7x}$

3) $y = 9xe^x - 9e^x$ 3) _____

A) $9e^x$

B) $9x$

C) $9xe^x$

D) $9xe^x + 18e^x$

4) $y = 2 \sec^6 x$ 4) _____

A) $12 \tan^2 x \sec^6 x$

B) $12 \tan x \sec^6 x$

C) $12 \sec^5 x$

D) $12 \tan^2 x \sec^5 x$

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

A) $4x^3 + 6x^2 - 18x + 2$

B) $16x^3 - 18x^2 + 4x + 2$

C) $16x^3 - 6x^2 + 18x + 2$

D) $12x^3 + 18x^2 - 6x + 2$

6) $y = \frac{x^2}{6 - 8x}$ 6) _____

A) $\frac{6x}{(6 - 8x)^2}$

B) $\frac{8x^3 - 16x^2 + 12x}{(6 - 8x)^2}$

C) $\frac{-24x^2 + 12x}{(6 - 8x)^2}$

D) $\frac{-8x^2 + 12x}{(6 - 8x)^2}$

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

A) $\frac{9}{x + 9}$

B) $\frac{9}{\sqrt{x}(\sqrt{x} + 9)^2}$

C) $\frac{18}{(x + 9)\sqrt{x} - 81}$

D) $-\frac{9}{\sqrt{x}(\sqrt{x} + 9)^2}$

Find the derivative of the given function.

8) $y = \tan^{-1} \sqrt{5x}$ 8) _____

A) $\frac{1}{1 + 5x}$

B) $\frac{5}{2(1 + 5x)\sqrt{5x}}$

C) $\frac{1}{\sqrt{1 - 5x}}$

D) $\frac{1}{10\sqrt{5x}(1 + 5x)}$

Find the derivative at each critical point and determine the local extreme values.

$$9) y = \begin{cases} 5 - 2x, & x \leq 1 \\ x + 2, & x > 1 \end{cases}$$

9) _____

A)

Critical Pt.	Derivative	Extremum	Value
$x = 2$	undefined	minimum	4

B)

Critical Pt.	Derivative	Extremum	Value
$x = 1$	undefined	minimum	3

C)

Critical Pt.	Derivative	Extremum	Value
$x = 1$	0	minimum	3

D)

Critical Pt.	Derivative	Extremum	Value
$x = 0$	0	minimum	4

$$10) y = x^{2/3}(x^2 - 16); x \geq 0$$

10) _____

A)

Critical Pt.	Derivative	Extremum	Value
$x = 0$	Undefined	local max	0
$x = 2$	0	minimum	-19.048813

B)

Critical Pt.	Derivative	Extremum	Value
$x = 0$	Undefined	local max	0
$x = 2$	0	minimum	31.748021

C)

Critical Pt.	Derivative	Extremum	Value
$x = 0$	Undefined	local max	4
$x = 2$	0	minimum	-19.048813

D)

Critical Pt.	Derivative	Extremum	Value
$x = 0$	0	maximum	0
$x = 2$	0	minimum	-19.048813

Determine the limit by substitution.

$$11) \lim_{x \rightarrow 10} \frac{x^2 + 100}{x + 10}$$

11) _____

A) Does not exist

B) 0

C) 10

D) 20

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 .

$$12) \begin{array}{c|cccc} x & f(x) & g(x) & f'(x) & g'(x) \\ 3 & 1 & 9 & 6 & 7 \\ 4 & -3 & 3 & 2 & -6 \end{array}$$

12) _____

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

A) $\frac{1}{2\sqrt{10}}$

B) $\frac{13}{2\sqrt{10}}$

C) $\frac{13}{\sqrt{10}}$

D) $-\frac{1}{2\sqrt{10}}$

Determine the limit algebraically, if it exists.

13) $\lim_{x \rightarrow 1} \frac{x^2 + 3x - 4}{x - 1}$ 13) _____
A) 3 B) 0 C) Does not exist D) 5

14) $\lim_{x \rightarrow 0} \frac{\frac{1}{x+2} - \frac{1}{2}}{x}$ 14) _____
A) $\frac{1}{4}$ B) $-\frac{1}{4}$ C) Does not exist D) 0

Use logarithmic differentiation to find dy/dx.

15) $y = 25^{-x}$ 15) _____
A) -25^{-x} B) 25^{-x} C) $-\ln 25 (25^{-x})$ D) $\ln 25 (25^{-x})$

Use the First or Second Derivative Test to determine the local extrema of the function, and identify any absolute extrema.

16) $y = xe^{5x}$ 16) _____
A) Absolute minimum at $\left(\frac{1}{5}, \frac{e}{5}\right)$ B) Absolute maximum at $\left(-\frac{1}{5}, -\frac{e}{5}\right)$
C) Absolute maximum at $\left(\frac{1}{5}, \frac{1}{5e}\right)$ D) Absolute minimum at $\left(-\frac{1}{5}, -\frac{1}{5e}\right)$

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

17) $\cos xy + x^7 = y^7$ 17) _____
A) $\frac{7x^6 - x \sin xy}{7y^6}$ B) $\frac{7x^6 - y \sin xy}{7y^6 + x \sin xy}$ C) $\frac{7x^6 + y \sin xy}{7y^6 - x \sin xy}$ D) $\frac{7x^6 + x \sin xy}{7y^6}$

Find the limit.

18) Let $\lim_{x \rightarrow 7} f(x) = 5$ and $\lim_{x \rightarrow 7} g(x) = -2$. Find $\lim_{x \rightarrow 7} [f(x) + g(x)]^2$. 18) _____
A) 9 B) 7 C) 3 D) 29

Find the limit, if it exists.

19) $\lim_{x \rightarrow -\infty} \frac{4x^3 + 3x^2}{x - 5x^2}$ 19) _____
A) ∞ B) $-\frac{3}{5}$ C) 4 D) $-\infty$

Find the horizontal tangents of the curve.

20) $y = x^4 - 32x^2 + 2$ 20) _____
A) At $x = 0, 4$ B) At $x = 0$ C) At $x = 4, -4$ D) At $x = 0, 4, -4$

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

- 21) $g(x) = -x^2 + 11x - 30$ on $5 \leq x \leq 6$ 21) _____
- A) Maximum value is $\frac{5}{4}$ at $x = \frac{13}{2}$; minimum value is 0 at $x = 6$ and 0 at $x = 5$
- B) Maximum value is $\frac{241}{4}$ at $x = \frac{11}{2}$; minimum value is 0 at $x = 6$ and 0 at $x = 5$
- C) Maximum value is $\frac{1}{4}$ at $x = \frac{11}{2}$; minimum value is 0 at $x = 6$ and 0 at $x = 5$
- D) Maximum value is $\frac{1}{4}$ at $x = \frac{13}{2}$; minimum value is 0 at $x = 6$ and 0 at $x = 5$

Find the points of inflection.

- 22) $y = x\sqrt{7 - x^2}$ 22) _____
- A) (0, 0) B) (7, 0)
- C) No inflection points. D) (0, 7)
- 23) $y = x\sqrt{11 - x^2}$ 23) _____
- A) (0, 0) B) (0, 11)
- C) (11, 0) D) No inflection points.

Give an appropriate answer.

- 24) Find the value or values of c that satisfy $\frac{f(b) - f(a)}{b - a} = f'(c)$ for the function $f(x) = x + \frac{48}{x}$ on the interval $[3, 16]$. 24) _____
- A) 3, 16 B) 0, $4\sqrt{3}$ C) $4\sqrt{3}$ D) $-4\sqrt{3}, 4\sqrt{3}$

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

- 25) $f(u) = \frac{1}{u}$, $u = g(x) = 7x - x^2$, $x = 1$ 25) _____
- A) $-\frac{5}{36}$ B) $\frac{5}{36}$ C) $\frac{1}{5}$ D) $-\frac{1}{5}$

Use the Concavity Test to find the intervals where the graph of the function is concave up.

- 26) $y = 6x - 5e^{-x}$ 26) _____
- A) $(-\infty, \infty)$ B) $(0, \infty)$ C) $(-\infty, 0)$ D) None

Find the indicated limit.

- 27) $\lim_{x \rightarrow 0^+} \frac{6x}{|x|}$ 27) _____
- A) 0 B) Does not exist C) -6 D) 6

Solve the problem.

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

- 29) At time t , the position of a body moving along the s -axis is $s = t^3 - 21t^2 + 144t$ m. Find the body's acceleration each time the velocity is zero. 29) _____
- A) $a(6) = 6 \text{ m/sec}^2$, $a(8) = -6 \text{ m/sec}^2$ B) $a(6) = 0 \text{ m/sec}^2$, $a(8) = 0 \text{ m/sec}^2$
C) $a(12) = 72 \text{ m/sec}^2$, $a(16) = 12 \text{ m/sec}^2$ D) $a(6) = -6 \text{ m/sec}^2$, $a(8) = 6 \text{ m/sec}^2$

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.

- 30) $u(2) = 6$, $u'(2) = 4$, $v(2) = -3$, $v'(2) = -5$. 30) _____
- $\frac{d}{dx}(uv)$ at $x = 2$
- A) 39 B) 42 C) -42 D) -18

Answer Key

Testname: AB FALL FINAL TEST REVIEW 1.1-3.4

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