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

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

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

Find dy/dx .

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

A) $\frac{-56x^2 + 128x + 21}{(8x^2 + 3)^2}$ B) $\frac{56x^3 - 112x^2 + 149x}{(8x^2 + 3)^2}$

C) $\frac{-56x^2 + 107x + 45}{(8x^2 + 3)^2}$ D) $\frac{168x^2 - 128x + 21}{(8x^2 + 3)^2}$

3) $y = \ln(\ln 5x)$ 3) _____
A) $\frac{1}{\ln 5x}$ B) $\frac{1}{x \ln 5x}$ C) $\frac{1}{x}$ D) $\frac{1}{5x}$

4) $y = 6 \sec^3 x$ 4) _____
A) $18 \sec^2 x$ B) $18 \tan^2 x \sec^3 x$ C) $18 \tan x \sec^3 x$ D) $18 \tan^2 x \sec^2 x$

5) $y = 7xe^x - 7e^x$ 5) _____
A) $7xe^x$ B) $7e^x$ C) $7x$ D) $7xe^x + 14e^x$

6) $y = \frac{\sqrt{x} - 8}{\sqrt{x} + 8}$ 6) _____
A) $\frac{16}{(x+8)\sqrt{x} - 64}$ B) $\frac{8}{\sqrt{x}(\sqrt{x} + 8)^2}$ C) $\frac{8}{x+8}$ D) $-\frac{8}{\sqrt{x}(\sqrt{x} + 8)^2}$

Determine the limit algebraically, if it exists.

7) $\lim_{x \rightarrow 0} \frac{\frac{1}{x+3} - \frac{1}{3}}{x}$ 7) _____
A) 0 B) $-\frac{1}{9}$ C) Does not exist D) $\frac{1}{9}$

- 8) $\lim_{x \rightarrow 7} \frac{x^2 + 2x - 63}{x - 7}$ 8) _____
- A) 2 B) 0 C) 16 D) Does not exist

Find the limit, if it exists.

- 9) $\lim_{x \rightarrow -\infty} \frac{4x^3 + 3x^2}{x - 6x^2}$ 9) _____
- A) $-\frac{1}{2}$ B) $-\infty$ C) 4 D) ∞

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

- 10) $y = xe^{2x}$ 10) _____
- A) Absolute maximum at $\left(-\frac{1}{2}, -\frac{e}{2}\right)$ B) Absolute minimum at $\left(\frac{1}{2}, \frac{e}{2}\right)$
- C) Absolute maximum at $\left(\frac{1}{2}, \frac{1}{2e}\right)$ D) Absolute minimum at $\left(-\frac{1}{2}, -\frac{1}{2e}\right)$

Find the derivative of the given function.

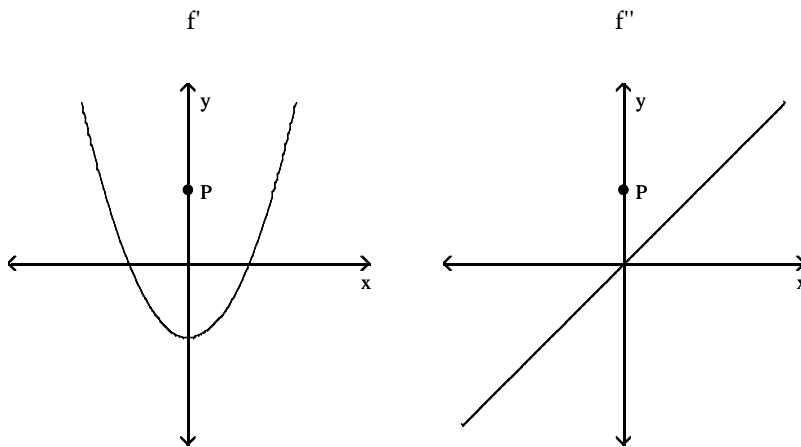
- 11) $y = \tan^{-1} \sqrt{5x}$ 11) _____
- A) $\frac{5}{2(1+5x)\sqrt{5x}}$ B) $\frac{1}{1+5x}$ C) $\frac{1}{\sqrt{1-5x}}$ D) $\frac{1}{10\sqrt{5x(1+5x)}}$

Determine the limit by substitution.

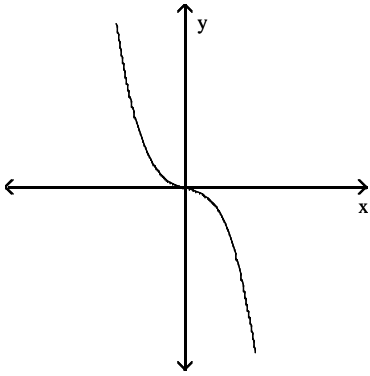
- 12) $\lim_{x \rightarrow 8} \frac{x^2 + 64}{x + 8}$ 12) _____
- A) 8 B) 0 C) Does not exist D) 16

Solve the problem.

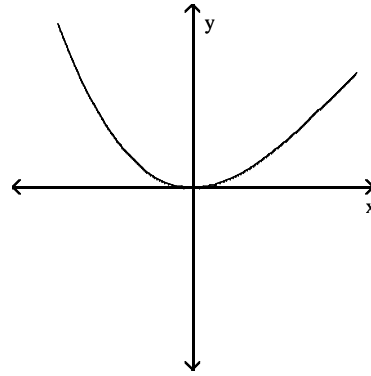
- 13) The graphs below show the first and second derivatives of a function $y = f(x)$. Select a possible graph of f that passes through the point P. 13) _____



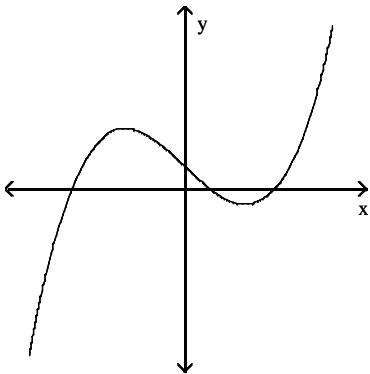
A)



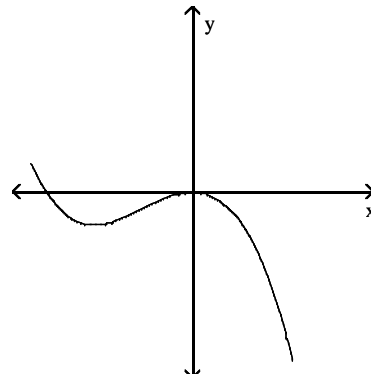
B)



C)

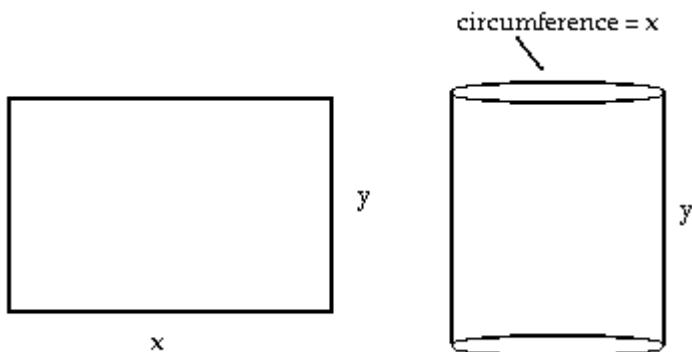


D)



- 14) 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 $t = 6$ sec. 14) _____
 A) 97 ft/sec B) 194 ft/sec C) 96 ft/sec D) 192 ft/sec
- 15) The cost of a computer system increases with increased processor speeds. The cost C of a system as a function of processor speed is estimated as $C = 11S^2 - 7S + 1000$, where S is the processor speed in MHz. Find the processor speed for which cost is at a minimum. Round to the nearest tenth if necessary. 15) _____
 A) 2.5 MHz B) 6.4 MHz C) 0.3 MHz D) 0.4 MHz
- 16) A man 6 ft tall walks at a rate of 7 ft/s away from a lamppost that is 18 ft high. At what rate is the length of his shadow changing when he is 70 ft away from the lamppost? 16) _____
 A) $\frac{7}{4}$ ft/s B) $\frac{7}{2}$ ft/s C) $\frac{7}{8}$ ft/s D) $\frac{245}{3}$ ft/s
- 17) A spherical balloon is inflated with helium at a rate of 90π ft³/min. How fast is the balloon's radius increasing when the radius is 3 ft? 17) _____
 A) 7.50 ft/min B) 2.50 ft/min C) 0.83 ft/min D) 3.75 ft/min
- 18) 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. 18) _____
 A) $a(10) = 6$ m/sec², $a(8) = -6$ m/sec² B) $a(10) = -6$ m/sec², $a(8) = 6$ m/sec²
 C) $a(20) = 120$ m/sec², $a(16) = 20$ m/sec² D) $a(10) = 0$ m/sec², $a(8) = 0$ m/sec²

- 19) A rectangular sheet of perimeter 33 cm and dimensions x cm by y cm is to be rolled into a cylinder as shown in part (a) of the figure. What values of x and y give the largest volume? 19) _____



- A) $x = 12$ cm; $y = \frac{9}{2}$ cm
 B) $x = 10$ cm; $y = \frac{13}{2}$ cm
 C) $x = 13$ cm; $y = \frac{7}{2}$ cm
 D) $x = 11$ cm; $y = \frac{11}{2}$ cm

Give an appropriate answer.

- 20) 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 $[3, 16]$. 20) _____
- A) $4\sqrt{3}$ B) 3, 16 C) $-4\sqrt{3}, 4\sqrt{3}$ D) 0, $4\sqrt{3}$

Find the points of inflection.

- 21) $y = x\sqrt{7 - x^2}$ 21) _____
- A) No inflection points. B) (0, 7)
 C) (0, 0) D) (7, 0)

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 .

- 22)

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
3	1	16	8	3
4	-3	3	5	-4

 22) _____
- $\sqrt{f(x) + g(x)}$ at $x = 3$
- A) $\frac{11}{2\sqrt{17}}$ B) $-\frac{1}{2\sqrt{17}}$ C) $\frac{1}{2\sqrt{17}}$ D) $\frac{11}{\sqrt{17}}$

Use a finite approximation to estimate the area of the region enclosed between the graph of f and the x -axis for $a \leq x \leq b$.

- 23) $f(x) = x^2$, $a = 3$, $b = 7$ 23) _____
- Use LRAM with four rectangles of equal width.
- A) 105 B) 86 C) 126 D) 117

24) $f(x) = \frac{1}{x}$, $a = 2$, $b = 9$

24) _____

Use MRAM with two rectangles of equal width.

A) $\frac{176}{435}$

B) $\frac{352}{435}$

C) $\frac{29848}{189225}$

D) $\frac{59696}{567675}$

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.

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

25) _____

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

A) -18

B) 39

C) -42

D) 42

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

26) $\cos xy + x^5 = y^5$

26) _____

A) $\frac{5x^4 + x \sin xy}{5y^4}$

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

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

D) $\frac{5x^4 - x \sin xy}{5y^4}$

Find the indicated limit.

27) $\lim_{x \rightarrow 0^+} \frac{7x}{|x|}$

27) _____

A) -7

B) 0

C) 7

D) Does not exist

Find the limit.

28) Let $\lim_{x \rightarrow 10} f(x) = 1$ and $\lim_{x \rightarrow 10} g(x) = 5$. Find $\lim_{x \rightarrow 10} [f(x) + g(x)]^2$.

28) _____

A) 36

B) -4

C) 26

D) 6

Find the horizontal tangents of the curve.

29) $y = x^4 - 2x^2 + 1$

29) _____

A) At $x = 1, -1$,

B) At $x = 0, 1, -1$

C) At $x = 0, 1$

D) At $x = 0$

Use logarithmic differentiation to find dy/dx .

30) $y = 22^{-x}$

30) _____

A) $\ln 22 (22^{-x})$

B) $-\ln 22 (22^{-x})$

C) -22^{-x}

D) 22^{-x}

Answer Key

Testname: BC FALL FINAL TEST REVIEW 1.1-4.2

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