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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)  $f(u) = \frac{1}{u}$ ,  $u = g(x) = 8x - x^2$ ,  $x = 1$  1) \_\_\_\_\_  
A)  $\frac{6}{49}$                       B)  $-\frac{1}{6}$                       C)  $-\frac{6}{49}$                       D)  $\frac{1}{6}$

**Find  $dy/dx$ .**

2)  $y = \frac{4x - 6}{6x^2 + 2}$  2) \_\_\_\_\_  
A)  $\frac{-24x^2 + 72x + 8}{(6x^2 + 2)^2}$                       B)  $\frac{24x^3 - 48x^2 + 80x}{(6x^2 + 2)^2}$   
C)  $\frac{-24x^2 + 64x + 20}{(6x^2 + 2)^2}$                       D)  $\frac{72x^2 - 72x + 8}{(6x^2 + 2)^2}$

3)  $y = \ln(\ln 9x)$  3) \_\_\_\_\_  
A)  $\frac{1}{\ln 9x}$                       B)  $\frac{1}{x \ln 9x}$                       C)  $\frac{1}{x}$                       D)  $\frac{1}{9x}$

4)  $y = 2 \sec^5 x$  4) \_\_\_\_\_  
A)  $10 \sec^4 x$                       B)  $10 \tan^2 x \sec^5 x$                       C)  $10 \tan x \sec^5 x$                       D)  $10 \tan^2 x \sec^4 x$

5)  $y = 10xe^x - 10e^x$  5) \_\_\_\_\_  
A)  $10xe^x$                       B)  $10e^x$                       C)  $10x$                       D)  $10xe^x + 20e^x$

**Determine the limit algebraically, if it exists.**

6)  $\lim_{x \rightarrow 0} \frac{\frac{1}{x+5} - \frac{1}{5}}{x}$  6) \_\_\_\_\_  
A) 0                      B)  $-\frac{1}{25}$                       C) Does not exist                      D)  $\frac{1}{25}$

7)  $\lim_{x \rightarrow 3} \frac{x^2 + 6x - 27}{x - 3}$  7) \_\_\_\_\_  
A) 6                      B) 0                      C) 12                      D) Does not exist

Find the limit, if it exists.

8)  $\lim_{x \rightarrow -\infty} \frac{6x^3 + 4x^2}{x - 7x^2}$

8) \_\_\_\_\_

A)  $-\frac{4}{7}$

B)  $-\infty$

C) 6

D)  $\infty$

Use the modified First or Second Derivative Test to determine any absolute extrema.

9)  $y = xe^{7x}$

9) \_\_\_\_\_

A) Absolute maximum at  $\left(-\frac{1}{7}, -\frac{e}{7}\right)$

B) Absolute minimum at  $\left(\frac{1}{7}, \frac{e}{7}\right)$

C) Absolute maximum at  $\left(\frac{1}{7}, \frac{1}{7e}\right)$

D) Absolute minimum at  $\left(-\frac{1}{7}, -\frac{1}{7e}\right)$

Find the derivative of the given function.

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

10) \_\_\_\_\_

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

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

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

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

Determine the limit by substitution.

11)  $\lim_{x \rightarrow 1} \frac{x^2 + 1}{x + 1}$

11) \_\_\_\_\_

A) 1

B) 0

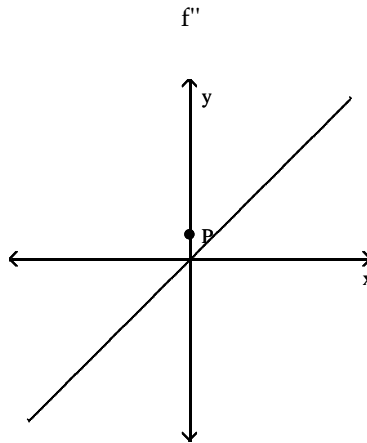
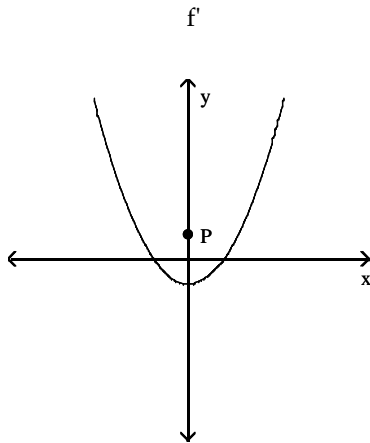
C) Does not exist

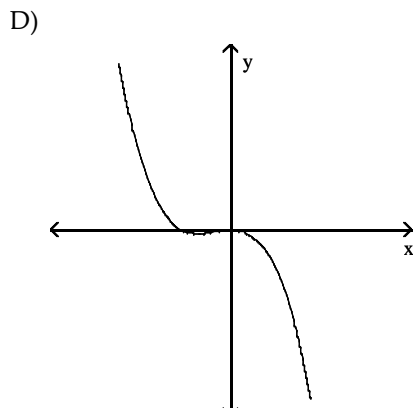
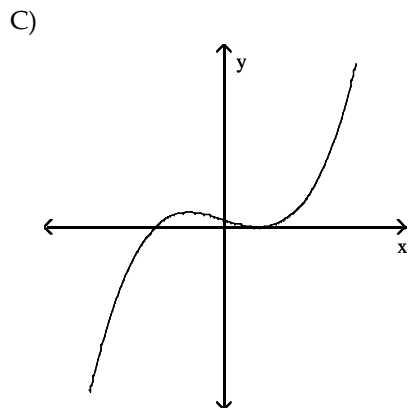
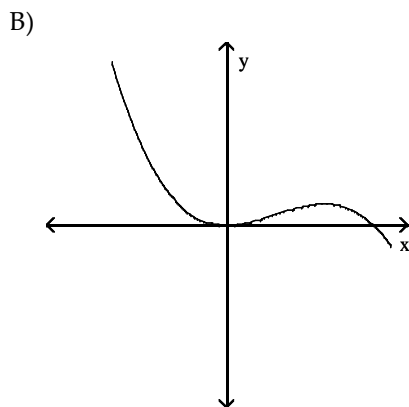
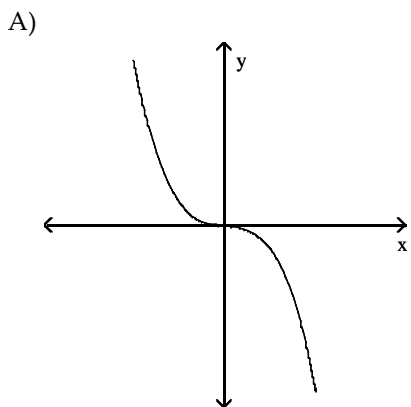
D) 2

Solve the problem.

12) 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.

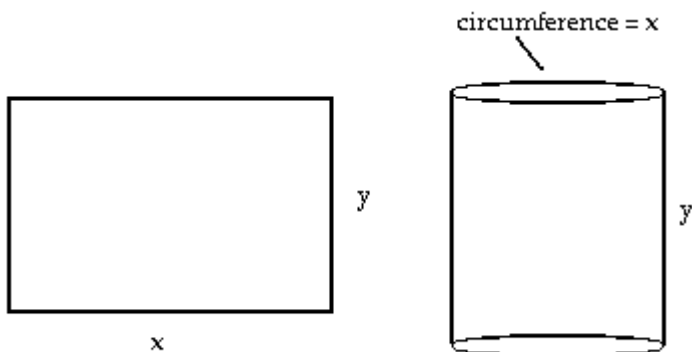
12) \_\_\_\_\_





- 13) 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. 13) \_\_\_\_\_  
 A) 65 ft/sec                      B) 130 ft/sec                      C) 64 ft/sec                      D) 128 ft/sec
- 14) A spherical balloon is inflated with helium at a rate of  $100\pi$  ft<sup>3</sup>/min. How fast is the balloon's radius increasing when the radius is 7 ft? 14) \_\_\_\_\_  
 A) 1.53 ft/min                      B) 0.51 ft/min                      C) 0.07 ft/min                      D) 1.79 ft/min
- 15) At time  $t$ , the position of a body moving along the  $s$ -axis is  $s = t^3 - 15t^2 + 48t$  m. Find the body's acceleration each time the velocity is zero. 15) \_\_\_\_\_  
 A)  $a(2) = -18$  m/sec<sup>2</sup>,  $a(8) = 18$  m/sec<sup>2</sup>                      B)  $a(2) = 18$  m/sec<sup>2</sup>,  $a(8) = -18$  m/sec<sup>2</sup>  
 C)  $a(4) = 24$  m/sec<sup>2</sup>,  $a(16) = 4$  m/sec<sup>2</sup>                      D)  $a(2) = 0$  m/sec<sup>2</sup>,  $a(8) = 0$  m/sec<sup>2</sup>

- 16) A rectangular sheet of perimeter 24 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? 16) \_\_\_\_\_



- A)  $x = 9$  cm;  $y = 3$  cm  
 B)  $x = 7$  cm;  $y = 5$  cm  
 C)  $x = 10$  cm;  $y = 2$  cm  
 D)  $x = 8$  cm;  $y = 4$  cm

Give an appropriate answer.

- 17) Find the value or values of  $c$  that satisfy  $\frac{f(b) - f(a)}{b - a} = f'(c)$  for the function  $f(x) = x + \frac{150}{x}$  on the interval  $[6, 25]$ . 17) \_\_\_\_\_

- A)  $5\sqrt{6}$   
 B) 6, 25  
 C)  $-5\sqrt{6}, 5\sqrt{6}$   
 D) 0,  $5\sqrt{6}$

Find the points of inflection.

- 18)  $y = x\sqrt{7 - x^2}$  18) \_\_\_\_\_

- 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  $x$ .

- 19) 

$x$	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
3	1	9	8	3
4	3	3	2	-4

 19) \_\_\_\_\_

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

- A)  $\frac{11}{2\sqrt{10}}$   
 B)  $-\frac{1}{2\sqrt{10}}$   
 C)  $\frac{1}{2\sqrt{10}}$   
 D)  $\frac{11}{\sqrt{10}}$

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.

- 20)  $u(2) = 8, u'(2) = 3, v(2) = -1, v'(2) = -4$ . 20) \_\_\_\_\_

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

- A) -29  
 B) 28  
 C) -35  
 D) 35

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

21)  $\cos xy + x^3 = y^3$

A)  $\frac{3x^2 + x \sin xy}{3y^2}$

B)  $\frac{3x^2 - y \sin xy}{3y^2 + x \sin xy}$

C)  $\frac{3x^2 + y \sin xy}{3y^2 - x \sin xy}$

D)  $\frac{3x^2 - x \sin xy}{3y^2}$

21) \_\_\_\_\_

Find the indicated limit.

22)  $\lim_{x \rightarrow 0^+} \frac{10x}{|x|}$

A) -10

B) 0

C) 10

D) Does not exist

22) \_\_\_\_\_

Find the limit.

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

A) 81

B) 11

C) 101

D) -9

23) \_\_\_\_\_

Find the horizontal tangents of the curve.

24)  $y = x^4 - 8x^2 - 6$

A) At  $x = 2, -2,$

B) At  $x = 0, 2, -2$

C) At  $x = 0, 2$

D) At  $x = 0$

24) \_\_\_\_\_

Find  $dy/dx$ .

25)  $y = 24^{-x}$

A)  $\ln 24 (24^{-x})$

B)  $-\ln 24 (24^{-x})$

C)  $-24^{-x}$

D)  $24^{-x}$

25) \_\_\_\_\_

## Answer Key

Testname: BC 1.1-3.8

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