#### Calculus for Business Economics Life Sciences and Social Sciences 13th Edition Barnett Test Bank

Full Download: http://testbanklive.com/download/calculus-for-business-economics-life-sciences-and-social-sciences-13th-edition-MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

#### Provide an appropriate response.

1) Given that 
$$f(x) = \frac{x}{7 - x}$$
, find  $f\left(-\frac{4}{5}\right)$ . Express the answer as a simplified fraction.  
A)  $\frac{39}{4}$   
B)  $\frac{4}{39}$   
C)  $-\frac{4}{39}$   
D)  $-\frac{39}{4}$ 

Answer: C

# The graph of a function f is given. Use the graph to answer the question.

2) Use the graph of f given below to find f(-10).



1

Use the graph to evaluate the indicated limit and function value or state that it does not exist.



# Find the limit, if it exists.

5) Find: 
$$\lim_{X \to -1} \frac{6x + 5}{5x - 6}$$
  
A) 1  
B)  $\frac{1}{11}$   
C) -11  
D)  $-\frac{1}{11}$ 

Answer: B

6) Given  $\lim_{x \to 4} f(x) = -2$  and  $\lim_{x \to 4} g(x) = 5$ , find  $\lim_{x \to 4} \frac{[g(x) - f(x)]}{-4 f(x)}$ . A)  $-\frac{3}{8}$ B)  $\frac{7}{8}$ C)  $-\frac{7}{8}$ D) $\frac{3}{8}$ Answer: B 7) Find:  $\lim_{x \to -4} \frac{x^2 - 16}{x + 4}$ A) 16 B) 8 C) -8 D) - 24 Answer: C 8) Find:  $\lim_{x \to 5} \frac{x-5}{|x-5|}$ A) –1 B) 1 C) 0 D) Does not exist Answer: D 9) Find:  $\lim_{x \to 3} \left( \frac{x^2 - 9}{x - 3} + \sqrt{x^2 + 7} \right)$ A) 10 B) 3 C) 2 D) Does not exist Answer: A 10) Find:  $\lim_{x \to 3} \frac{x-3}{x^2 - 3x}$ A)  $\frac{1}{3}$ B)  $-\frac{1}{3}$ C) 0 D) Does not exist Answer: D

11) Given  $\lim_{x \to 5} f(x) = 4$  and  $\lim_{x \to 5} g(x) = -5$ , find  $\lim_{x \to 5} \frac{2f(x) + 3g(x)}{3f(x)}$ . A)  $-\frac{7}{12}$ B)  $\frac{7}{12}$ C)  $-\frac{7}{15}$ D)  $\frac{7}{15}$ 

Answer: A

12) Evaluate the following limit

 $\lim_{x \to 2^{-}} \frac{1}{x-2}$ A)  $\infty$ B) 2
C)  $-\infty$ D) Does not exist

Answer: D

13) Let 
$$f(x) = \frac{x^2 - 3x - 10}{x + 2}$$
. Find  $\lim_{x \to -2} f(x)$ .  
A) -2  
B) 5  
C) -7  
D) Does not exist

Answer: C

14) Let 
$$f(x) = \begin{cases} \frac{x^2 - 16}{x + 4} & \text{if } x > 0\\ \frac{x^2 - 16}{x - 4} & \text{if } x < 0 \end{cases}$$

Find  $\lim_{x \to 0^{-}} f(x)$ . A) -4 B)  $\infty$ C) 4 D) Does not exist

Answer: C

15) Let 
$$f(x) = \begin{cases} \frac{x^2 - 16}{x + 4} & \text{if } x > 0\\ \frac{x^2 - 16}{x - 4} & \text{if } x < 0 \end{cases}$$
  
Find  $\lim_{x \to 0^+} f(x)$   
A) 0  
B) -4  
C) 4  
D) Does not exist  
Answer: B

16) Let 
$$f(x) = \begin{cases} \frac{x^2 - 16}{x + 4} & \text{if } x > 0\\ \frac{x^2 - 16}{x - 4} & \text{if } x < 0 \end{cases}$$
  
Find  $\lim_{x \to 0} f(x)$ .  
A)  $-\infty$   
B)  $-4$ 

Ć) 0

D) Does not exist

Answer: D

17) Evaluate the following limit.

$$\lim_{x \to 2^{+}} \frac{1}{x-2}$$
A) 2
B) - $\infty$ 
C)  $\infty$ 
D) Does not exist
Answer: D

Sketch a possible graph of a function that satisfies the given conditions.













# Find the limit, if it exists.

20) Find:  $\lim_{h \to 0} \frac{f(7 + h) - f(7)}{h}$  for f(x) = -x + 1. A) 1 B) -1 C) 0 D) Does not exist Answer: B

#### Solve the problem.

21) A company training program determines that, on average, a new employee can do P(x) pieces of work per day after s days of on-the-job training, where  $P(x) = \frac{90 + 60x}{x + 5}$ . Find  $\lim_{x \to 5} P(x)$ . A) 105

B) 30 C) 42 D) Does not exist

Answer: B

22) The cost of manufacturing a particular videotape is C(x) = 9000 + 9x, where x is the number of tapes produced. The average cost per tape, denoted by  $\overline{C}(x)$ , is found by dividing C(x) by x. Find lim  $\overline{C}(x)$ .

x→9000

A) 10 B) 14 C) 6 D) Does not exist Answer: A Use the given graph to find the indicated limit.

















26)



# Find the limit.

27) Determine the limit.

 $\lim_{x \to -10^{-}} f(x), \text{ where } f(x) = \frac{1}{x + 10}$ A) -\infty B) 0 C) -1 D) \infty Answer: A

28) Determine the limit.

$$\lim_{x \to 5^+} f(x), \text{ where } f(x) = \frac{x^2}{(x-5)^3}$$
  
A) -2  
B) - $\infty$   
C) 5  
D)  $\infty$   
Answer: D

# Provide an appropriate response.

29) If the limit at infinity exists, find the limit.

$$\lim_{x \to \infty} \frac{5x^2 + 7x - 9}{-6x^2 + 2}$$
A)  $-\frac{5}{6}$ 
B)  $-\frac{2}{9}$ 
C)  $\infty$ 
D) 0
Answer: A

30) If the limit at infinity exists, find the limit.  $2x^2 + 5x$ 

$$\lim_{x \to \infty} \frac{3x^3 + 5x}{4x^4 + 10x^3 + 2}$$
A) 0
B)  $\frac{3}{4}$ 
C)  $\infty$ 
D) 1
Answer: A

# Use $-\infty$ or $\infty$ where appropriate to describe the behavior at each zero of the denominator and identify all vertical asymptotes.

31)  $g(x) = \frac{x}{6 - x}$ 

- A)  $\lim_{x \to 6^-} f(x) = -\infty$ ;  $\lim_{x \to 6^+} f(x) = \infty$ ; x = 6 is a vertical asymptote
- B)  $\lim_{x \to 6^{-}} f(x) = -\infty; \lim_{x \to 6^{+}} f(x) = -\infty; x = 6 \text{ is a vertical asymptote}$
- C)  $\lim_{x \to 6^-} f(x) = \infty$ ;  $\lim_{x \to 6^+} f(x) = -\infty$ ; x = 6 is a vertical asymptote
- D)  $\lim_{x \to 6^-} f(x) = \infty$ ;  $\lim_{x \to 6^+} f(x) = -\infty$ ; x = 0 is a vertical asymptote

Answer: C

32) 
$$f(x) = \frac{x^2 - 16}{x^2 + 16}$$

- A)  $\lim_{x \to 4^-} f(x) = \infty$ ;  $\lim_{x \to 4^+} f(x) = -\infty$ ; x = 4 is a vertical asymptote
- B) No zeros of denominator; no vertical asymptotes
- C)  $\lim_{x \to -4^-} f(x) = \infty$ ;  $\lim_{x \to -4^+} f(x) = -\infty$ ; x = -4 is a vertical asymptote
- D)  $\lim_{x \to 4^-} f(x) = \infty$ ;  $\lim_{x \to 4^+} f(x) = \infty$ ; x = 0 is a vertical asymptote

Answer: B

33)

# Describe the end behavior of the function.

$$f(x) = 5x^{4} + 5x + 11$$
A) 
$$\lim_{x \to \infty} f(x) = -\infty; \quad \lim_{x \to -\infty} f(x) = \infty$$
B) 
$$\lim_{x \to \infty} f(x) = -\infty; \quad \lim_{x \to -\infty} f(x) = -\infty$$
C) 
$$\lim_{x \to \infty} f(x) = \infty; \quad \lim_{x \to -\infty} f(x) = -\infty$$
D) 
$$\lim_{x \to \infty} f(x) = \infty; \quad \lim_{x \to -\infty} f(x) = \infty$$

Answer: D

#### Provide an appropriate response.

34) Find the vertical asymptote(s) of the graph of the given function.

$$f(x) = \frac{3x - 9}{5x + 30}$$
  
A) x = -6  
B) y = -3  
C) x = -8  
D) y = 8  
Answer: A

35) Find the vertical asymptote(s) of the graph of the given function.

$$f(x) = \frac{x^2 - 100}{(x - 9)(x + 3)}$$
  
A) x = 10, x = -10  
B) x = 9, x = -3  
C) y = 9, y = -3  
D) x = -9  
Answer: B

36) Find the horizontal asymptote, if any, of the given function.

$$f(x) = \frac{(x-3)(x+4)}{x^2-4}$$
  
A) y = 1  
B) x = 2, x = -2  
C) y = 3, y = -4  
D) None  
Answer: A

37) Find the horizontal asymptote, if any, of the given function.

$$f(x) = \frac{2x^3 - 3x - 9}{9x^3 - 5x + 3}$$
  
A)  $y = \frac{3}{5}$   
B)  $y = \frac{2}{9}$   
C)  $y = 0$   
D) None  
Answer: B

#### Solve the problem.

38) Suppose that the value V of a certain product decreases, or depreciates, with time t, in months, where

 $V(t) = 37 - \frac{16t^2}{(t+2)^2}.$ Find  $\lim_{t\to\infty} V(t).$ A) 16 B) 21 C) 37 D) 33 Answer: B 39) Suppose that the value V of a certain product decreases, or depreciates, with time t, in months, where

V(t) = 100 -  $\frac{40t^2}{(t+2)^2}$ . Find lim V(t). A) 80 B) 40 C) 100 D) 60 Answer: D

40) Suppose that the cost C of removing p% of the pollutants from a chemical dumping site is given by

 $C(p) = \frac{\$40,000}{100 - p}$ 

Can a company afford to remove 100% of the pollutants? Explain.

A) Yes, the cost of removing p% of the pollutants is \$40,000, which is certainly affordable.

B) No, the cost of removing p% of the pollutants is \$400, which is a prohibitive amount of money.

C) Yes, the cost of removing p% of the pollutants is \$400, which is certainly affordable.

D) No, the cost of removing p% of the pollutants increases without bound as p approaches 100.

Answer: D

Sketch a possible graph of a function that satisfies the given conditions.





Answer: A





The graph of y = f(x) is shown. Use the graph to answer the question. 43) Is f continuous at x = -1.5?







45) Is f continuous at x = 0?



Provide an appropriate response.

46) Determine where the function  $H(x) = \frac{x^2 + 7}{x^2 + x - 6}$  is continuous.

A) 
$$(-\infty, -3) \cup (-3, 2) \cup (2, \infty)$$
  
B)  $(-3, 2) \cup (2, \infty)$   
C)  $(-\infty, -3)$   
D)  $(-\infty, -3) \cup (-3, 2)$   
Answer: A

47) Determine where the function  $f(x) = \frac{5x}{2x - 3}$  is continuous.

$$A) \left(\frac{3}{2}, \infty\right)$$
  

$$B) (-\infty, \infty)$$
  

$$C) \left(-\infty, \frac{3}{2}\right)$$
  

$$D) \left(-\infty, \frac{3}{2}\right) \cup \left(\frac{3}{2}, \infty\right)$$

Answer: D

48) Determine the points at which the function is discontinuous.

$$h(x) = \begin{cases} x^2 - 4 & \text{for } x < -1 \\ 0 & \text{for } -1 \le x \le 1 \\ x^2 + 4 & \text{for } x > 1 \end{cases}$$
A) 1
B) -1, 1
C) -1, 0, 1
D) None
Answer: B

49) Use a graphing utility to approximate the partition numbers of the function to four decimal places:

 $\begin{array}{l} f(x) = x^4 - 8x^2 - 4x + 1. \\ A) (-\infty, -2.4976) \\ B) (-\infty, -2.4976) \cup (0.1832, 3.0347) \\ C) (-\infty, -2.4976) \cup (-2.4976, -0.7203) \\ D) (-\infty, -2.4976) \cup (-2.4976, -0.7203) \cup (-0.7203, 0.1832) \cup (0.1832, 3.0347) \\ Answer: D \end{array}$ 

50) Use a graphing utility to find the discontinuities of the given rational function.

 $g(x) = \frac{x+1}{x^3 + 2x^2 + 10x - 13}$ A) 3 B) 1 C) -1 D) Continuous at all values of x Answer: B

51) Use a graphing utility to find the discontinuities of the given rational function.

 $g(x) = \frac{x+1}{x^3 + 2x^2 + 10x - 13}$ A) 3 B) -1 C) 1 D) Continuous at all values of x Answer: C 52) Use a graphing utility to find the discontinuities of the given rational function.

 $f(x) = \frac{x^2 + 2x + 1}{x^3 + 2x^2 + 5x - 8}$ A) 3 B) -1 C) 1 D) Continuous at all values of x Answer: C

53) Solve the inequality and express the answer in interval notation:  $\frac{x^2 - 4x}{x + 5} > 0$ .

A) (-5, 0)B)  $(-5, 0) \cup (4, \infty)$ C)  $(-5, \infty)$ D)  $(4, \infty)$ Answer: B

54) Use a sign chart to solve the inequality. Express answers in interval notation.

 $\begin{array}{l} x^2 > 16 \\ A) \; (-4, \; 4 \; ) \\ B) \; (-4, \; \infty) \\ C) \; (4, \; \infty) \\ D) \; (-\infty, \; -4) \; \cup \; (4, \; \infty) \\ Answer: \; D \end{array}$ 

55) Use a sign chart to solve the inequality. Express answers in interval notation.

 $x^{2} + 6 < 2x$ A) {2} B)  $\emptyset$ C) (2,  $\infty$ ) D) (- $\infty$ , -2) Answer: B

56) Use a sign chart to solve the inequality. Express answers in interval notation.

$$\frac{-5}{-3x-4} > 0$$

$$A)\left(-\frac{4}{3},\infty\right)$$

$$B)(0,\infty)$$

$$C)\left(-\infty,-\frac{3}{4}\right)$$

$$D)\left(-\infty,\frac{4}{3}\right)$$

Answer: A

# Solve the problem.

57) The cost of renting a snowblower is \$20 for the first hour (or any fraction thereof) and \$5 for each additional hour (or fraction thereof) up to a maximum rental time of 5 hours. Write a piecewise definition of the cost C(x) of renting a snowblower for x hours. Is C(x) continuous at x = 2.5?

A) C(x) = 
$$\begin{cases} 20 \text{ if } 0 \le x \le 1\\ 25 \text{ if } 1 \le x \le 2\\ 30 \text{ if } 2 \le x \le 3; \text{ No}\\ 35 \text{ if } 3 \le x \le 4\\ 40 \text{ if } 4 \le x \le 5\\ 20 \text{ if } 0 < x \le 1\\ 25 \text{ if } 1 < x \le 2\\ 30 \text{ if } 2 < x \le 3; \text{ Yes}\\ 35 \text{ if } 3 < x \le 4\\ 40 \text{ if } 4 < x \le 5 \end{cases}$$
  
C) C(x) = 
$$\begin{cases} 20 \text{ if } 0 < x \le 1\\ 25 \text{ if } 1 < x \le 2\\ 30 \text{ if } 2 < x \le 3; \text{ Yes}\\ 35 \text{ if } 3 < x \le 4\\ 40 \text{ if } 4 < x \le 5 \end{cases}$$
  
D) C(x) = 
$$\begin{cases} 20 \text{ if } 0 < x \le 1\\ 25 \text{ if } 1 < x \le 2\\ 30 \text{ if } 2 < x \le 3; \text{ No}\\ 35 \text{ if } 3 < x \le 4\\ 40 \text{ if } 4 < x \le 5 \end{cases}$$
  
D) C(x) = 
$$\begin{cases} 25 \text{ if } 0 < x \le 1\\ 30 \text{ if } 1 < x \le 2\\ 35 \text{ if } 2 < x \le 3; \text{ No}\\ 40 \text{ if } 3 < x \le 4\\ 45 \text{ if } 4 < x \le 5 \end{cases}$$

Answer: B

Find average rate of change for the function over the given interval.

58)  $y = x^{2} + 6x$  between x = 5 and x = 9A)  $\frac{135}{4}$ B)  $\frac{80}{9}$ C) 15 D) 20 Answer: D 59)  $y = 7x^{3} + 7x^{2} + 3$  between x = -6 and x = -1A) 252 B)  $\frac{3}{5}$ C) - 3 D) - 1260

Answer: A

60) Find the average rate of change for  $f(x) = \sqrt{2x}$  if x changes from 2 to 8.

A) 7 B) 2 C)  $\frac{1}{3}$ D)  $-\frac{3}{10}$ 

Answer: C

61) Find the average rate of change of y with respect to x if x changes from 3 to 5 in the function  $y = x^2 + 3x$ .

A) 9

B) 11

C) 4 D) 22

Answer: B

# Find the instantaneous rate of change for the function at the value given.

62) Find the instantaneous rate of change for the function  $x^2 + 4x$  at x = 6.

A) 16

B) 10

C) 12

D) 60

Answer: A

63) Find the instantaneous rate of change for the function  $f(x) = 5x^2 + x$  at x = -4.

- A) –14
- B) -39
- C) -41
- D) 6

Answer: B

# Provide an appropriate response.

64) Use the four step process to find f'(x) for the function  $f(x) = 5x^2 - 3x$ .

A) 10x - 3 B) 5h - 3 C) 5h<sup>2</sup> - 3h D) 10x + 5h - 3 Answer: D 65) Use the four step process to find f'(x) for the function  $f(x) = \frac{2}{x^2}$ .

A) 
$$\frac{(h + 2x)}{x^2(x + h)^2}$$
  
B)  $\frac{2(h + x)}{x^2(x + h)^2}$   
C)  $-\frac{2(h + 2x)}{x^2(x + h)^2}$   
D)  $-\frac{2(h + 2x + xh)}{x^2(x + h)^2}$ 

Answer: C

66) Use the four step process to find f'(x) for the function  $f(x) = \frac{x}{6-x}$ .

A) 
$$\frac{6}{(x-6)(x+h-6)}$$
  
B)  $-\frac{x}{(x-6)(x+h-6)}$   
C)  $\frac{1}{(x-6)(x+h-6)}$   
D)  $-\frac{6}{h(x-6)(x+h-6)}$ 

Answer: A

Use the definition  $f'(x) = \frac{\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}}{h}$  to find the derivative at x. 67) f(x) = 9x - 16A) -9 B) 9 C) 9x D) -7 Answer: B 68)  $f(x) = 10 - 14x^2$ A)  $-28x^2$ B) -28xC) 10 - 28xD) 10 - 14x

Answer: B

69)  $f(x) = 4x + 9x^3$ A)  $4x + 27x^2$ B)  $4x + 27x^3$ C)  $4 + 27x^2$ D)  $4 + 9x^2$ Answer: C Provide an appropriate response.

70) Find the slope of the secant line joining (2, f(2)) and (3, f(3)) for  $f(x) = -3x^2 - 8$ .

- A) –55
- B) 55
- C) 15 D) -15
- Answer: D

71) Find the slope of the graph  $f(x) = -x^2 + 3x$  at the point (1, 2).

A) 1 B) -1 C) 2 D) -2

Answer: A

72) Find the slope of the line tangent to the graph of the function at the given value of x.

 $y = x^{4} + 2x^{3} + 2x + 2 \text{ at } x = -3$ A) -52 B) 65 C) 67 D) -50 Answer: A

73) Given f(x + h) - f(x) = 4xh + 4h + 2h<sup>2</sup>, find the slope of the tangent line at x = 4.
A) 20
B) 22
C) 8
D) 16
Answer: A

Find the equation of the tangent line to the curve when x has the given value.

74)  $f(x) = -4 - x^2$ ; x = 4A) y = -2xB) y = 8x - 12C) y = -8x + 12D) y = 4x + 12Answer: C

75) Find the equation of the tangent line to the graph of the function at the given value of x.

$$f(x) = x^{2} + 5x \text{ at } x = 4$$
  
A) y = 13x - 16  
B) y =  $-\frac{4}{25}x + \frac{8}{5}$   
C) y =  $\frac{1}{20}x + \frac{1}{5}$   
D) y =  $-39x - 80$   
Answer: A

# Solve the problem.

- 76) Suppose an object moves along the y-axis so that its location is  $y = f(x) = x^2 + x$  at time x (y is in meters and x is in seconds). Find the average velocity (the average rate of change of y with respect to x) for x changing from 2 to 9 seconds.
  - A) 84 m/s
  - B) 15 m/s
  - C) 3 m/s
  - D) 12 m/s
  - Answer: D
- 77) Suppose an object moves along the y-axis so that its location is  $y = f(x) = x^2 + x$  at time x (y is in meters and x is in seconds). Find the average velocity for x changing from 3 to 3 + h seconds.
  - A) 12 h m/s B) 12 + h m/s C) 7 - h m/s D) 7 + h m/s Answer: D

78) Suppose an object moves along the y-axis so that its location is  $y = f(x) = x^2 + x$  at time x (y is in meters and x is in seconds). Find the instantaneous velocity at x = 4 seconds.

- A) 8 m/s B) 10 m/s C) 9 m/s
- D) 20 m/s
- Answer: C

List the x-values in the graph at which the function is not differentiable.





81)



# Solve the problem.

- 82) If an object moves along a line so that it is at  $y = f(x) = 2x^2 7x 6$  at time x (in seconds), find the instantaneous velocity function v = f'(x).
  - A)  $2x^2 7$ B)  $4x^2 - 7$
  - C) 4x 7
  - D) 2x 7

Answer: C

83) If an object moves along a line so that it is at  $y = f(x) = 8x^2$  at time x (in seconds), find the velocity at x = 1 (y is measured in feet).

A) 8 ft / s
B) 160 ft/s
C) 6 ft/sec
D) 16 ft / s

Answer: D

- 84) The electric power p (in W) as a function of the current i (in A) in a certain circuit is given by  $p(i) = 10i^2 + 63i$ . Find the instantaneous rate of change of p with respect to i for i = 0.9 A.
  - A) 72 W/A B) 81 W/A C) 74.7 W/A D) 64.8 W/A Answer: B

#### Provide an appropriate response.

85) Find f'(x) if  $f(x) = \pi$ . A)  $f'(x) = \pi$ B) f'(x) = 0C) f'(x) = 1D)  $f'(x) = \pi^2$ Answer: B 86) Find y' if  $y = \frac{5}{8}$ . A) 1 B)  $\frac{5}{8}x$ C) 0 D) $\frac{5}{8}$ Answer: C 87) Find y' if y = 6x. A) x<sup>2</sup> B) 6 C) 0 D) x Answer: B 88) Find f'(x) for  $f(x) = 2x^5 + 6x^8$ . A)  $2x^4 + 6x^7$ B)  $10x^6 + 48x^9$ C)  $10x^4 + 48x^7$ D)  $10x^3 + 48x^2$ Answer: C 89) Find the derivative of  $y = \frac{3x^5 - 7x^2 - 4}{3x^5 - 7x^2 - 4}$ 

A) 
$$y' = 9x^2 + 8x^{-3}$$
  
B)  $y' = 18x^2 + 8x^{-3}$   
C)  $y' = 9x^{-2} + 8x^{-3}$   
D)  $y' = 9x^2 + 8x^3$   
Answer: A

90) Let f and g be functions that satisfy f'(4) = 2 and g'(4) = -3. Find h'(4) for h(x) = 3f(x) - g(x) + 2. A) 9 B) 11 C) 5 D) 2 Answer: A 91) Find f'(x) if  $f(x) = 3x^4 + 6x^7$ . A)  $12x^3 + 42x^6$ B)  $4x^3 + 7x^6$ C)  $7x^3 + 13x^6$ D)  $3x^5 + 7x^8$ Answer: A 92) Find f'(x) if  $f(x) = 6x^{-2} + 8x^3 + 11x$ . A)  $f(x) = -12x^{-1} + 24x^2$ B)  $f'(x) = -12x^{-1} + 24x^2 + 11$ C)  $f'(x) = -12x^{-3} + 24x^2$ D)  $f'(x) = -12x^{-3} + 24x^2 + 11$ Answer: D 93) Find f'(x) if  $f(x) = 9x^{7/5} - 5x^2 + 10000$ . A)  $f'(x) = \frac{63}{5} x^{2/5} - 10x$ B)  $f'(x) = \frac{63}{5} x^{6/5} - 10x$ C)  $f'(x) = \frac{63}{5}x^{6/5} - 10x + 4000$ D) f'(x) =  $\frac{63}{5} x^{2/5} - 10x + 4000$ Answer: A 94) Find:  $\frac{d}{dx}\left(\frac{4}{x^4} - 4\sqrt[5]{x}\right)$ 

(4) Find: 
$$\frac{1}{dx} \left[ \frac{1}{x^4} - 4\sqrt{x} \right]$$
  
(A)  $-\frac{16}{x^3} - \frac{4}{5}\sqrt[4]{x}$   
(B)  $\frac{16}{x^3} - 20\sqrt[4]{x}$   
(C)  $-\frac{16}{x^5} - \frac{4}{5\sqrt[5]{x^4}}$   
(D)  $\frac{1}{x^3} - \frac{4}{5}\sqrt[4]{x}$ 

Answer: C

95) Find: 
$$\frac{dy}{dt}$$
 if  $y = 3t^{-4} - 5t^{-1}$   
A)  $-\frac{12}{t^5} - \frac{5}{t^2}$   
B)  $-12t^{-5} - 5t^2$   
C)  $-12t^5 - 5t^2$   
D)  $-12t^{-5} + 5t^{-2}$   
Answer: D  
96) Find:  $\frac{d}{dx} \left( \frac{4}{x^4} - 5\sqrt[3]{x} \right)$   
A)  $\frac{1}{4x^3} - \frac{5}{3}x^{-2/3}$   
B)  $\frac{1}{4}x^{-5} - 15x^{2/3}$   
C)  $\frac{1}{x^3} + \frac{5}{3}x^{-4/3}$   
D)  $-16x^{-5} - \frac{5}{3}x^{-2/3}$ 

Answer: D

97) Find 
$$\frac{d}{dv} (6v^{0.7} - v^{5.8})$$
  
A)  $4.2v^{-0.3} - 5.8v^{4.8}$   
B)  $4.2v^{-0.3} - 5.8v^{4.7}$   
C)  $4.2v^{-0.3} - 5.8v^{-4.7}$   
D)  $4.2v^{-0.3} - 5.8v^{-4.8}$   
Answer: A

98) Find 
$$\frac{dy}{dx}$$
 for  $y = \frac{1}{3x^3} + \frac{x^7}{10}$ .  
A)  $-x^{-2} + \frac{7}{10}x^7$   
B)  $\frac{7x^6}{9x^2 + 10}$   
C)  $\frac{1}{9x^2} + \frac{7x^6}{10}$   
D)  $-x^{-4} + \frac{7}{10}x^6$ 

Answer: D

99) Find the equation of the tangent line at x = 7 for  $f(x) = 6 - x^2$ . Write the answer in the form y = mx + b.

A) y = -14x + 55B) y = -2xC) y = 7x + 55D) y = 14x - 55

Answer: A

100) Find the equation of the tangent line at x = -6 for  $f(x) = \frac{x^3}{2}$ . Write the answer in the form y = mx + b.

A) y = 216x + 18B) y = 54x + 216C) y = 18x + 216D) y = 216x + 54Answer: B

101) Find the values of x where the tangent line is horizontal for  $f(x) = 3x^3 - 2x^2 - 9$ .

A) 
$$x = 0, x = -\frac{4}{9}$$
  
B)  $x = 0, x = \frac{4}{9}$   
C)  $x = 0, x = -\frac{2}{3}$   
D)  $x = 0, x = \frac{2}{3}$ 

Answer: B

102) Find the equation of the tangent line at x = 2 for  $f(x) = 4 + x - 2x^2 - 3x^3$ . Write the answer in the form

y = mx + b.A) y = -39x + 52B) y = -43x + 60C) y = -47x + 68D) y = -43x + 48Answer: B

#### Solve the problem.

103) An object moves along the y-axis (marked in feet) so that its position at time t (in seconds) is given by

 $f(t) = 9t^3 - 9t^2 + t + 7$ . Find the velocity at three seconds.

A) 192 feet per second

B) 197 feet per second

- C) 190 feet per second
- D) 109 feet per second

Answer: C

104) A pen manufacturer determined that the total cost in dollars of producing x dozen pens in one day is given by:

 $C(x) = 350 + 2x - 0.01x^2$  $0 \le x \le 100$ 

Find the marginal cost at a production level of 70 dozen pens and interpret the result.

- A) The marginal cost is \$0.58/doz. The cost of producing 1 dozen more pens at a production level of 70 dozen pens is approximately \$0.58.
- B) The marginal cost is \$0.60/doz. The cost of producing 1 dozen more pens at a production level of 70 dozen pens is approximately \$0.60.
- C) The marginal cost is \$0.62/doz. The cost of producing 1 dozen more pens at a production level of 70 dozen pens is approximately \$0.62.
- D) The marginal cost is \$0.59/doz. The cost of producing 1 dozen more pens at a production level of 70 dozen pens is approximately \$0.59.

Answer: B

105) According to one theory of learning, the number of items, w(t), that a person can learn after t hours of instruction is given by:

 $w(t) = 15\sqrt[3]{t^2}$  $0 \le t \le 64$ 

Find the rate of learning at the end of eight hours of instruction.

A) 5 items per hour

B) 45 items per hour

C) 20 items per hour

D) 60 items per hour

Answer: A

# Find $\triangle y$ for the given values of $x_1$ and $x_2$ .

106) y = 2x + 3; x = 18,  $\Delta x = 0.5$ A) 5 B) 0.1 C) 0.5 D) 1 Answer: D

# Find dy.

107)  $y = 5x^2 - 7x - 7$ A) 10x - 7 dx B) 10x dx C) 10x - 14 dx D) (10x - 7) dx Answer: D

108) 
$$y = x\sqrt{5x + 1}$$
  
A) 
$$\frac{15x - 2}{2\sqrt{5x + 1}} dx$$
  
B) 
$$\frac{15x - 2}{\sqrt{5x + 1}} dx$$
  
C) 
$$\frac{15x + 2}{2\sqrt{5x + 1}} dx$$
  
D) 
$$\frac{15x + 2}{\sqrt{5x + 1}} dx$$

Answer: C

# Provide an appropriate response.

109) Evaluate dy and  $\triangle y$  for  $y = f(x) = x^2 - 7x + 5$ , x = 7, and  $dx = \triangle x = 0.5$ . A) dy = 3.5;  $\triangle y = 3.75$ B) dy = 3.5;  $\triangle y = 3.5$ C) dy = 3.75;  $\triangle y = 3.75$ D) dy = 3.75;  $\triangle y = 3.5$ Answer: A

110) Evaluate dy and  $\triangle y$  for  $y = f(x) = 20 + 15x^2 - x^3$ , x = 2, and  $dx = \triangle x = 0.3$ . A) dy = 15.183;  $\triangle y = 14.4$ B) dy = 14.4;  $\triangle y = 15.183$ C) dy = 14.4;  $\triangle y = 14.4$ D) dy = 15.183;  $\triangle y = 15.183$ Answer: B

111) A spherical balloon is being inflated. Find the approximate change in volume if the radius increases from 6.2 cm to 6.4 cm. (Recall that  $V = \frac{4}{3}\pi r^3$ .)

A) 0.992π cm<sup>3</sup>
B) 153.76π cm<sup>3</sup>
C) 317.77 cm<sup>3</sup>
D) 30.752π cm<sup>3</sup>
Answer: D

# Solve the problem.

112) A cube 4 inches on an edge is given a protective coating 0.1 inches thick. About how much coating should a production manager order for 900 cubes?

A) About 4320 in.<sup>2</sup>
B) About 5760 in.<sup>3</sup>
C) About 1440 in.<sup>2</sup>
D) About 8640 in.<sup>3</sup>

Answer: D

- 113) One hour after x milligrams of a particular drug are given to a person, the change in body temperature T (in degrees Fahrenheit) is given by  $T = x^2 \left(1 \frac{x}{9}\right)$ , where  $0 \le x \le 3$ . Approximate the changes in body temperature produced by changing the drug dosage from 1 to 1.9 milligrams. Round to the nearest hundredth when necessary. A) 0.22°F
  - ., B) 1.5°F
  - C) 1.67°F
  - D) 3.17°F

Answer: B

114)  $V = \frac{4}{3}\pi r^3$ , where r is the radius, in centimeters. By approximately how much does the volume of a sphere

increase when the radius is increased from 1.0 cm to 1.1 cm? (Use 3.14 for  $\pi$ .)

A) 1.1 cm<sup>3</sup> B) 1.3 cm<sup>3</sup> C) 1.5 cm<sup>3</sup> D) 0.1 cm<sup>3</sup> Answer: B

# Provide an appropriate response.

115) Suppose that the total profit in hundreds of dollars from selling x items is given by  $P(x) = 4x^2 - 5x + 10$ . Find the marginal profit at x = 5.

A) \$32B) \$15C) \$35

D) \$45

Answer: C

- 116) The revenue (in thousands of dollars) from producing x units of an item is modeled by  $R(x) = 5x 0.0005x^2$ . Find the marginal revenue at x = 1000.
  - A) \$4.50
    B) \$104.00
    C) \$10,300.00
    D) \$4.00

Answer: D

117) Let C(x) be the cost function and R(x) the revenue function. Compute the marginal cost, marginal revenue, and the marginal profit functions.

$$\begin{split} C(x) &= 0.0004x^3 - 0.036x^2 + 200x + 40,000\\ R(x) &= 450x\\ A) \ C'(x) &= 0.0012x^2 - 0.072x + 200\\ R'(x) &= 450\\ P'(x) &= -0.0012x^2 + 0.072x + 250\\ B) \ C'(x) &= 0.0012x^2 - 0.072x + 200\\ R'(x) &= 450\\ P'(x) &= 0.0012x^2 - 0.072x - 250\\ C) \ C'(x) &= 0.0012x^2 + 0.072x + 200\\ R'(x) &= 450\\ P'(x) &= 0.0012x^2 + 0.072x + 250\\ R'(x) &= 450\\ P'(x) &= 0.0012x^2 + 0.072x + 250\\ Answer: A \end{split}$$

118) The total cost to produce x units of paint is C(x) = (5x + 3)(7x + 4). Find the marginal average cost function.

A) 
$$\overline{C'}(x) = 70x + 41$$
  
B)  $\overline{C'}(x) = 35x + 41 + \frac{12}{x}$   
C)  $\overline{C'}(x) = 70 - \frac{41}{x}$   
D)  $\overline{C'}(x) = 35 - \frac{12}{x^2}$ 

Answer: D

119) The total profit from selling x units of doorknobs is P(x) = (6x - 7)(9x - 8). Find the marginal average profit function.

A) 
$$\overline{P}'(x) = 54 - \frac{56}{x^2}$$
  
B)  $\overline{P}'(x) = 54x - 111$   
C)  $\overline{P}'(x) = 54x - 56$   
D)  $\overline{P}'(x) = 54 - \frac{111}{x^2}$ 

Answer: A

120) The total cost in dollars of producing x lawn mowers is given by  $C(x) = 4,000 + 90x - \frac{x^2}{3}$ . Find the marginal

average cost at x = 20,  $\overline{C}'(20)$  and interpret the result.

- A) -\$13.33; a unit increase in production will decrease the average cost per unit by approximately \$13.33 at a production level of 20 units.
- B) -\$10.33; a unit increase in production will decrease the average cost per unit by approximately \$10.33 at a production level of 20 units.
- C) -\$20.33; a unit increase in production will decrease the average cost per unit by approximately \$20.33 at a production level of 20 units.
- D) -\$1.33; a unit increase in production will decrease the average cost per unit by approximately \$1.33 at a production level of 20 units.

Answer: B

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#### Solve the problem.

121) The demand equation for a certain item is  $p = 14 - \frac{x}{1,000}$  and the cost equation is C(x) = 7,000 + 4x. Find the

marginal profit at a production level of 3,000 and interpret the result.

- A) \$14; at the 3,000 level of production, profit will increase by approximately \$14 for each unit increase in production.
- B) \$16; at the 3,000 level of production, profit will increase by approximately \$16 for each unit increase in production.
- C) \$7; at the 3,000 level of production, profit will increase by approximately \$7 for each unit increase in production.
- D) \$4; at the 3,000 level of production, profit will increase by approximately \$4 for each unit increase in production.

Answer: D

122) A company is planning to manufacture a new blender. After conducting extensive market surveys, the research department estimates a weekly demand of 600 blenders at a price of \$50 per blender and a weekly demand of 800 blenders at a price of \$40 per blender. Assuming the demand equation is linear, use the research department's estimates to find the revenue equation in terms of the demand x.

A) 
$$R(x) = 80x - 20x^2$$
  
B)  $R(x) = 80x - \frac{x^2}{20}$   
C)  $R(x) = 20x + \frac{x^2}{20}$   
D)  $R(x) = 80x - 20$   
Answer: B

- 123) Suppose the demand for a certain item is given by  $D(p) = -3p^2 + 4p + 8$ , where p represents the price of the item. Find D'(p), the rate of change of demand with respect to price.
  - A) D'(p) = -3p + 4B) D'(p) = -6p + 4C)  $D'(p) = -3p^2 + 4$ D)  $D'(p) = -6p^2 + 4$ Answer: B

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