Calculus for Business Economics Life Sciences and Social Sciences 14th edition Barnett Test Bank

SKU: 9780134668574-TEST-BANK

Exam

Name_____

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

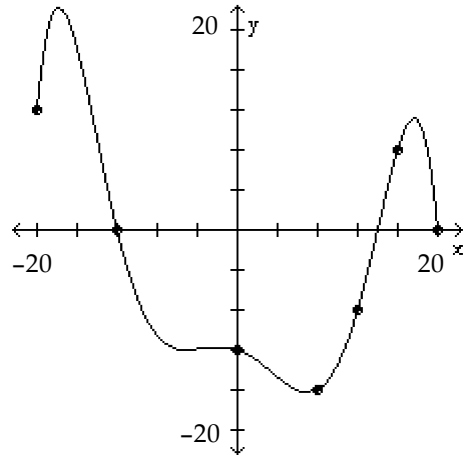
Provide an appropriate response.

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

A) $-\frac{4}{39}$ B) $-\frac{39}{4}$ C) $\frac{39}{4}$ D) $\frac{4}{39}$

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

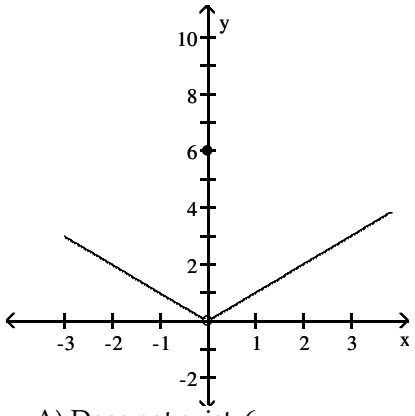
2) Use the graph of f given below to find f(8). 2) _____



A) 12 B) −16 C) 0 D) 8

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

3) Find $\lim_{x \to 0} f(x)$ and f(0). 3) _____

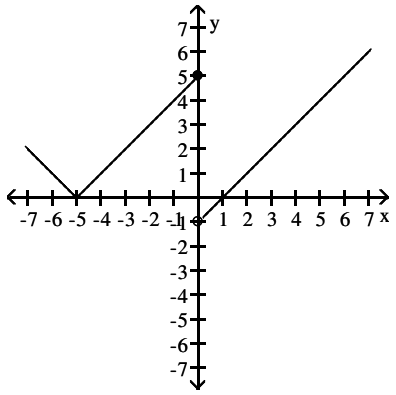


A) Does not exist; 6 B) 6; 0

C) 0; 6 D) 0; does not exist

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4) Find $\lim_{x \to 0^-} f(x)$ and $\lim_{x \to 0^+} f(x)$. 4) _____



A) –1; 5
B) Does not exist; does not exist
C) 5; –1
D) 5; Does not exist

Find the limit, if it exists.

5) Find: $\lim_{x \to -1} \frac{6x + 5}{5x - 6}$ 5) _____

A) –11
B) $\frac{1}{11}$
C) 1
D) $-\frac{1}{11}$

6) Given $\lim_{x \to 4} f(x) = -2$ and $\lim_{x \to 4} g(x) = 5$, find $\lim_{x \to 4} \frac{[g(x) - f(x)]}{-4 f(x)}$. 6) _____

A) $-\frac{3}{8}$
B) $\frac{3}{8}$
C) $\frac{7}{8}$
D) $-\frac{7}{8}$

7) Find: $\lim_{x \to -4} \frac{x^2 - 16}{x + 4}$ 7) _____

A) 8
B) –8
C) – 24
D) 16

8) Find: $\lim_{x \to 5} \frac{x - 5}{|x - 5|}$ 8) _____

A) –1
B) 1
C) 0
D) Does not exist

9) Find: $\lim_{x \to 3} \left(\frac{x^2 - 9}{x - 3} + \sqrt{x^2 + 7} \right)$ 9) _____

A) 2
B) 3
C) 10
D) Does not exist

10) Find: $\lim_{x \to 3} \frac{x - 3}{x^2 - 3x}$ 10) _____

A) $-\frac{1}{3}$
B) $\frac{1}{3}$
C) 0
D) Does not exist

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11) Given $\lim_{x \to 5} f(x) = 4$ and $\lim_{x \to 5} g(x) = -5$, find $\lim_{x \to 5} \frac{2f(x) + 3g(x)}{3f(x)}$. 11) _____

A) $\frac{7}{12}$ B) $-\frac{7}{15}$ C) $\frac{7}{15}$ D) $-\frac{7}{12}$

12) Evaluate the following limit 12) _____

$\lim_{x \to 2^-} \frac{1}{x - 2}$

A) ∞ B) 2 C) $-\infty$ D) Does not exist

13) Let $f(x) = \frac{x^2 - 3x - 10}{x + 2}$. Find $\lim_{x \to -2} f(x)$. 13) _____

A) 5 B) –2 C) –7 D) Does not exist

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

Find $\lim_{x \to 0^-} f(x)$.

A) ∞ B) –4 C) 4 D) Does not exist

15) Let $f(x) = \begin{cases} \frac{x^2 - 16}{x + 4} \text{ if } x > 0 \\ \frac{x^2 - 16}{x - 4} \text{ if } x < 0 \end{cases}$ 15) _____

Find $\lim_{x \to 0^+} f(x)$

A) 4 B) –4 C) 0 D) Does not exist

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

Find $\lim_{x \to 0} f(x)$.

A) $-\infty$ B) 0 C) –4 D) Does not exist

17) Evaluate the following limit. 17) _____

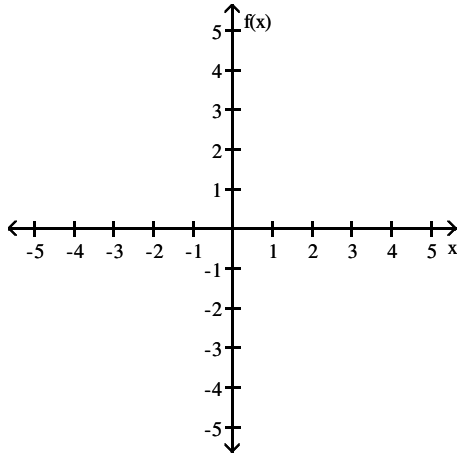
$\lim_{x \to 2^+} \frac{1}{x - 2}$

A) 2 B) ∞ C) $-\infty$ D) Does not exist

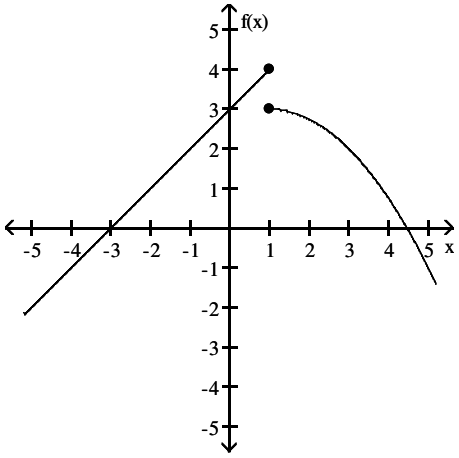
Sketch a possible graph of a function that satisfies the given conditions.

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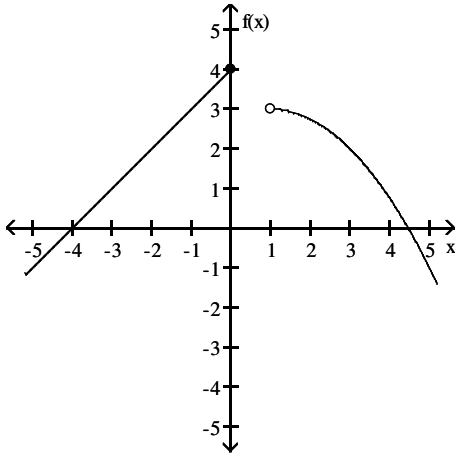
18) $f(1) = 4$; $\lim_{x \to 1^-} f(x) = 4$; $\lim_{x \to 1^+} f(x) = 3$ 18) _____



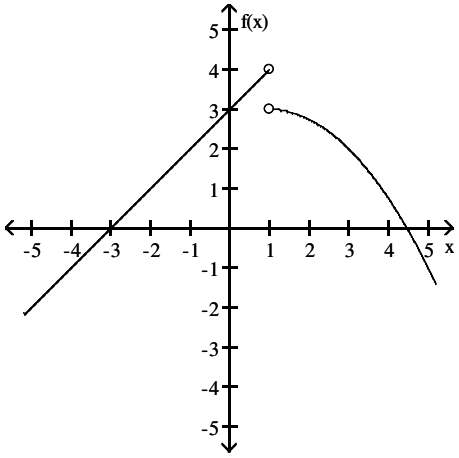
A)



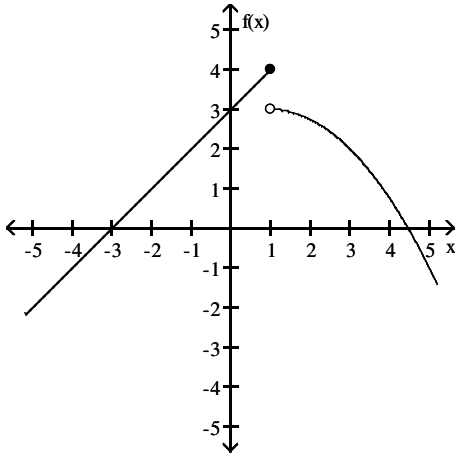
B)



C)

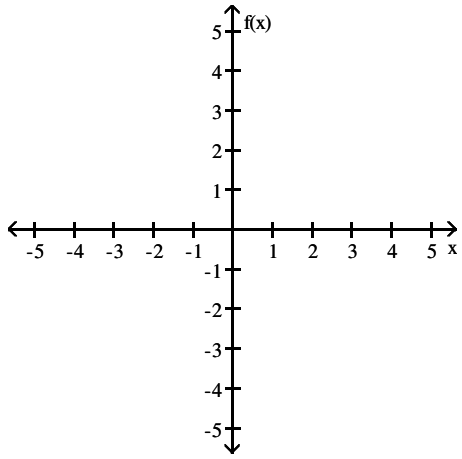


D)

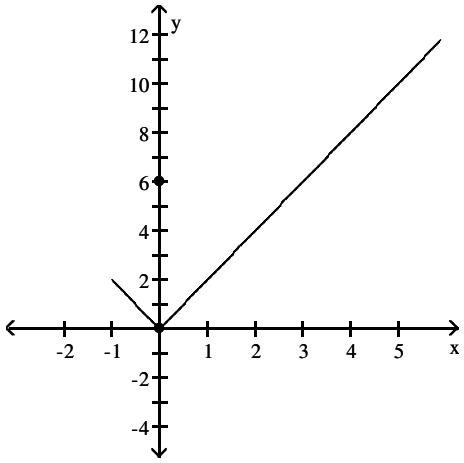


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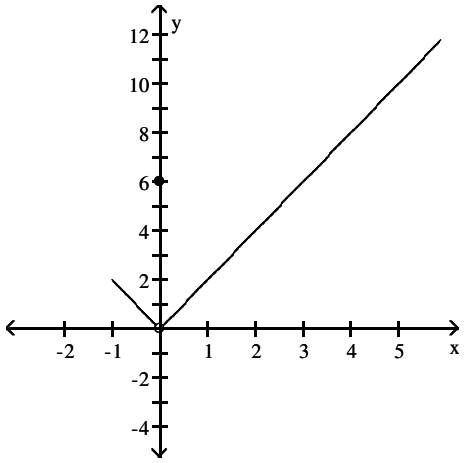
19) $f(0) = 6$; $\lim_{x \to 0^-} f(x) = 0$; $\lim_{x \to 0^+} f(x) = 0$ 19) _____



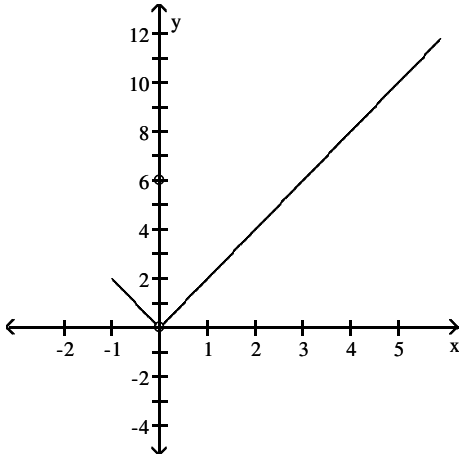
A)



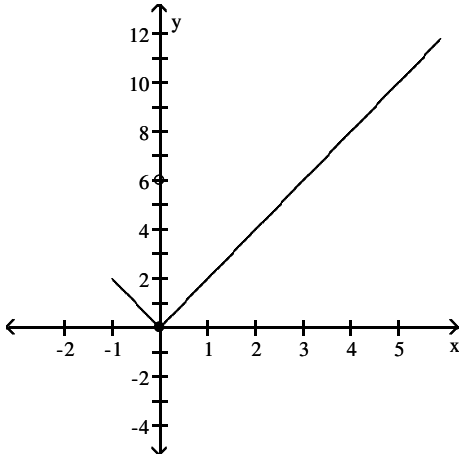
B)



C)



D)



Find the limit, if it exists.

20) Find: $\lim_{h \to 0} \frac{f(7 + h) - f(7)}{h}$ for $f(x) = -x + 1$. 20) _____

A) 1 B) 0 C) –1 D) Does not exist

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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 $\lim_{x \to -5} P(x)$. 21) _____

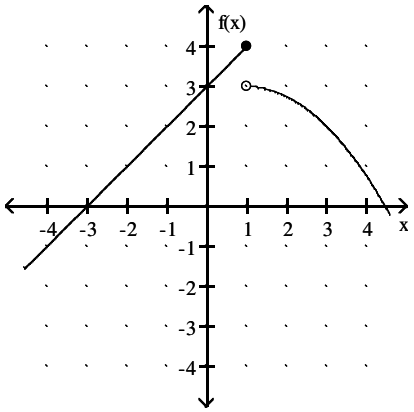
A) 42 B) 30 C) 105 D) Does not exist

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 $\lim_{x \to 9000} \overline{C}(x)$. 22) _____

A) 14 B) 6 C) 10 D) Does not exist

Use the given graph to find the indicated limit.

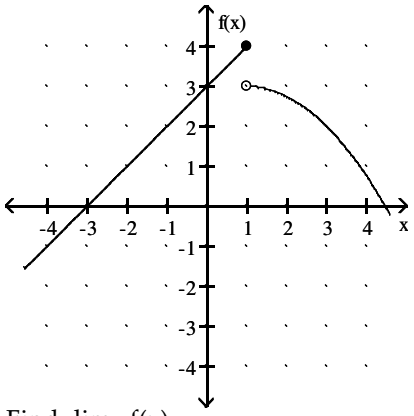
23) 23) _____



Find $\lim_{x \to \infty} f(x)$.

A) 3 B) -∞ C) 4 D) ∞

24) 24) _____

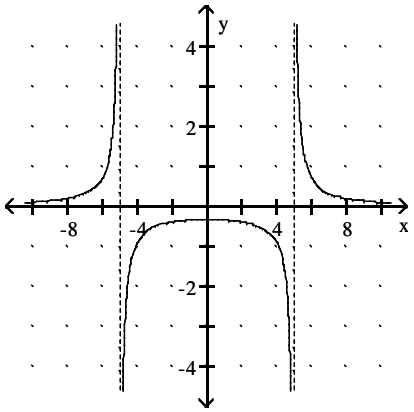


Find $\lim_{x \to -\infty} f(x)$.

A) -∞ B) 4 C) ∞ D) 3

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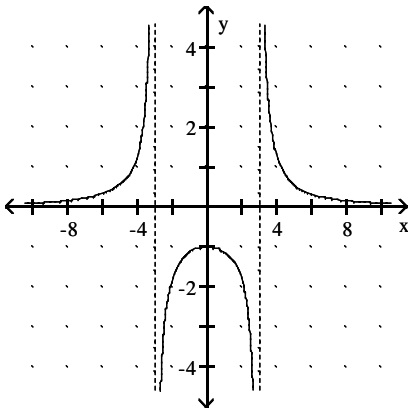
25) 25) _____



$\lim_{x \to 5^+} f(x)$

A) $-\infty$ B) 5 C) 0 D) ∞

26) 26) _____



$\lim_{x \to 3^-} f(x)$

A) 0 B) 3 C) ∞ D) $-\infty$

Find the limit.

27) Determine the limit. 27) _____

$\lim_{x \to -10^-} f(x)$, where $f(x) = \dfrac{1}{x + 10}$

A) ∞ B) 0 C) -1 D) $-\infty$

28) Determine the limit. 28) _____

$\lim_{x \to 5^+} f(x)$, where $f(x) = \dfrac{x^2}{(x - 5)^3}$

A) $-\infty$ B) -2 C) ∞ D) 5

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Provide an appropriate response.

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

$$\lim_{x \to \infty} \frac{5x^2 + 7x - 9}{-6x^2 + 2}$$

A) 0 B) ∞ C) $-\frac{5}{6}$ D) $-\frac{2}{9}$

30) If the limit at infinity exists, find the limit. 30) _____

$$\lim_{x \to \infty} \frac{3x^3 + 5x}{4x^4 + 10x^3 + 2}$$

A) $\frac{3}{4}$ B) 1 C) 0 D) ∞

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

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

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

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

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

A) No zeros of denominator; no vertical asymptotes

B) $\lim_{x \to -4^-} f(x) = \infty$; $\lim_{x \to -4^+} f(x) = -\infty$; $x = -4$ is a vertical asymptote

C) $\lim_{x \to 4^-} f(x) = \infty$; $\lim_{x \to 4^+} f(x) = \infty$; $x = 0$ is a vertical asymptote

D) $\lim_{x \to 4^-} f(x) = \infty$; $\lim_{x \to 4^+} f(x) = -\infty$; $x = 4$ is a vertical asymptote

Describe the end behavior of the function.

33) $f(x) = 5x^4 + 5x + 11$ 33) _____

A) $\lim_{x \to \infty} f(x) = -\infty$; $\lim_{x \to -\infty} f(x) = \infty$

B) $\lim_{x \to \infty} f(x) = \infty$; $\lim_{x \to -\infty} f(x) = \infty$

C) $\lim_{x \to \infty} f(x) = -\infty$; $\lim_{x \to -\infty} f(x) = -\infty$

D) $\lim_{x \to \infty} f(x) = \infty$; $\lim_{x \to -\infty} f(x) = -\infty$

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Provide an appropriate response.

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

$$f(x) = \frac{3x - 9}{5x + 30}$$

A) $y = 8$ B) $y = -3$ C) $x = -8$ D) $x = -6$

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

$$f(x) = \frac{x^2 - 100}{(x - 9)(x + 3)}$$

A) $x = -9$ B) $x = 9, x = -3$ C) $x = 10, x = -10$ D) $y = 9, y = -3$

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

$$f(x) = \frac{(x - 3)(x + 4)}{x^2 - 4}$$

A) $x = 2, x = -2$ B) $y = 1$ C) $y = 3, y = -4$ D) None

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

$$f(x) = \frac{2x^3 - 3x - 9}{9x^3 - 5x + 3}$$

A) $y = 0$ B) $y = \frac{3}{5}$ C) $y = \frac{2}{9}$ D) None

Solve the problem.

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

$$V(t) = 23 - \frac{16t^2}{(t + 2)^2}.$$

Find $\lim_{t \to \infty} V(t)$.

A) 19 B) 7 C) 23 D) 16

39) Suppose that the value V of a certain product decreases, or depreciates, with time t, in months, wher 39) _____

$$V(t) = 100 - \frac{30t^2}{(t + 2)^2}.$$

Find $\lim_{t \to \infty} V(t)$.

A) 30 B) 100 C) 70 D) 85

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

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

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

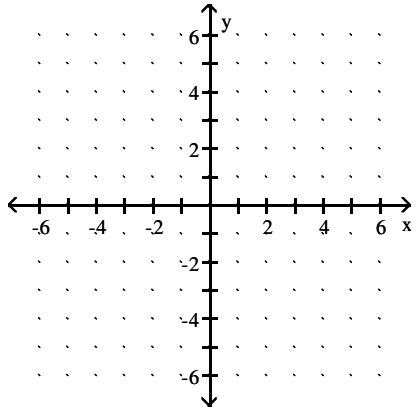
A) No, the cost of removing p% of the pollutants is $400, which is a prohibitive amount of money.
B) Yes, the cost of removing p% of the pollutants is $40,000, which is certainly affordable.
C) No, the cost of removing p% of the pollutants increases without bound as p approaches 100.
D) Yes, the cost of removing p% of the pollutants is $400, which is certainly affordable.

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

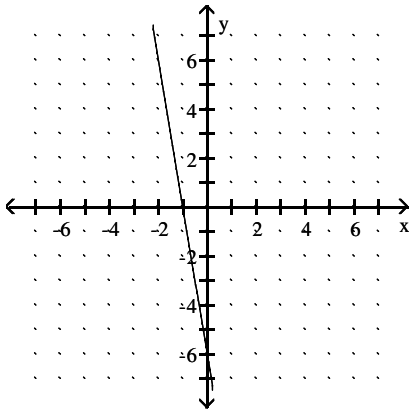
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41) $f(0) = 6$ and $\lim_{x \to 0} f(x) = 6$

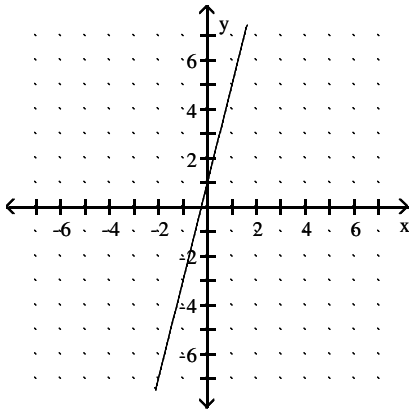
41) _____



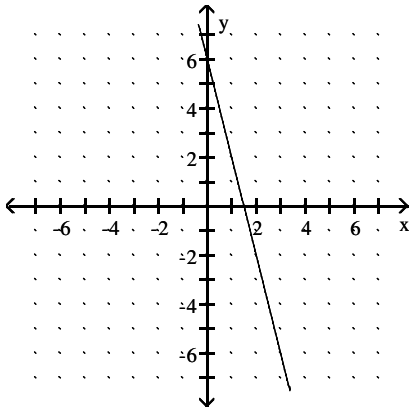
A)



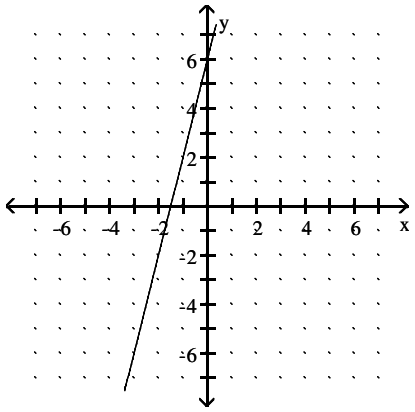
B)



C)

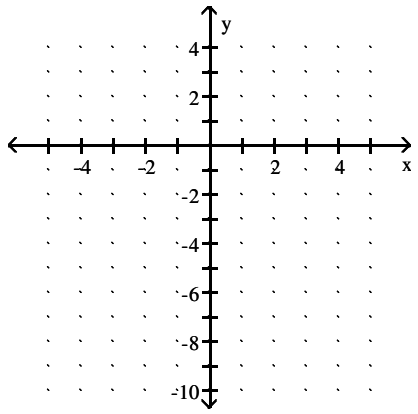


D)

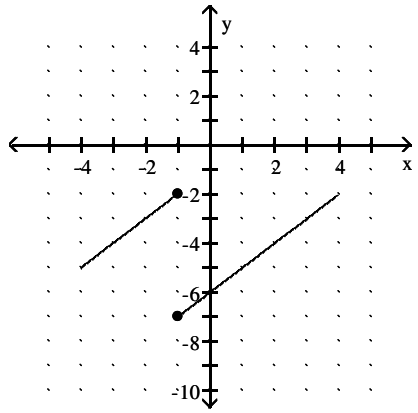


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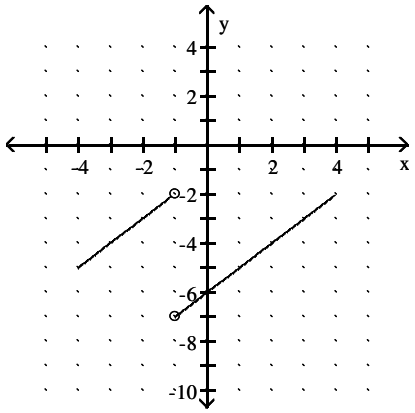
42) $f(-1) = -7$; $\lim_{x \to (-1)^-} f(x) = -2$; $\lim_{x \to (-1)^+} f(x) = -7$ 42) _____



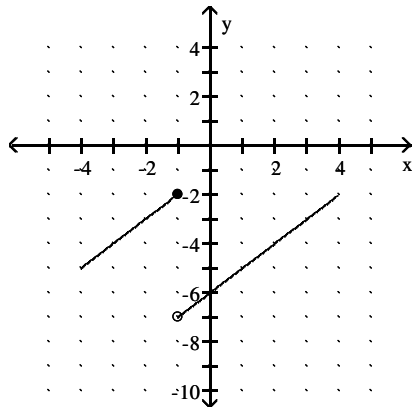
A)



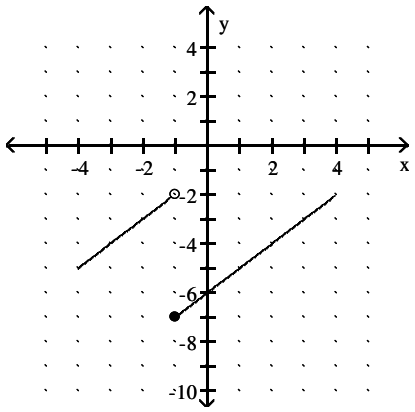
B)



C)



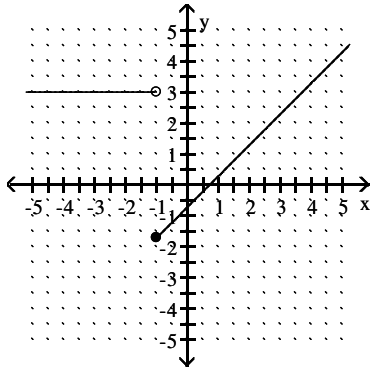
D)



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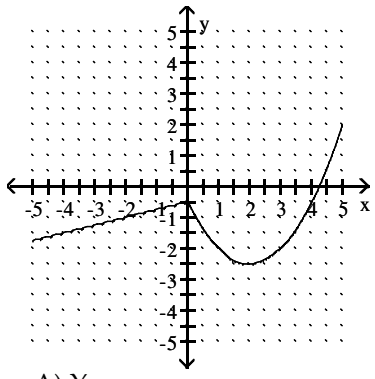
The graph of y = f(x) is shown. Use the graph to answer the question.

43) Is f continuous at x = –1? 43) _____



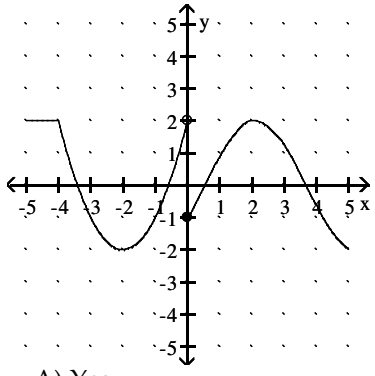
A) No B) Yes

44) Is f continuous at x = 2? 44) _____



A) Yes B) No

45) Is f continuous at x = –1? 45) _____



A) Yes B) No

Provide an appropriate response.

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

A) $(-\infty, -3) \cup (-3, 2) \cup (2, \infty)$ B) $(-3, 2) \cup (2, \infty)$

C) $(-\infty, -3)$ D) $(-\infty, -3) \cup (-3, 2)$

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

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

48) Determine the x–values, if any, at which the function is discontinuous. 48) _____

$$h(x) = \begin{cases} x^2 - 9 & \text{for } x < -1 \\ 0 & \text{for } -1 \le x \le 1 \\ x^2 + 9 & \text{for } x > 1 \end{cases}$$

A) –1, 1 B) 1 C) –1, 0, 1 D) None

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

$f(x) = x^4 - 8x^2 - 4x + 1$.

A) $(-\infty, -2.4976) \cup (0.1832 , 3.0347)$

B) $(-\infty, -2.4976)$

C) $(-\infty, -2.4976) \cup (-2.4976, -0.7203) \cup (-0.7203, 0.1832) \cup (0.1832 , 3.0347)$

D) $(-\infty, -2.4976) \cup (-2.4976, -0.7203)$

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

$$g(x) = \frac{x + 1}{x^3 + 2x^2 + 10x - 13}$$

A) –1 B) 1

C) 3 D) Continuous at all values of x

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

$$g(x) = \frac{x + 1}{x^3 + 2x^2 + 10x - 13}$$

A) 3 B) –1

C) 1 D) Continuous at all values of x

52) Use a graphing utility to find the discontinuities of the given rational function. 52) _____

$$f(x) = \frac{x^2 + 2x + 1}{x^3 + 2x^2 + 5x - 8}$$

A) 1 B) 3

C) –1 D) Continuous at all values of x

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

A) (–5, 0) B) (4, ∞) C) $(-5, 0) \cup (4, \infty)$ D) (–5, ∞)

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

$x^2 > 16$

A) (4, ∞) B) (–4, ∞) C) (–4, 4) D) $(-\infty, -4) \cup (4, \infty)$

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

$x^2 + 6 < 2x$

A) ∅ B) (2 , ∞) C) (–∞, –2) D) {2}

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

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

A) $(0, \infty)$ B) $\left(-\infty, -\frac{3}{4}\right)$ C) $\left(-\infty, \frac{4}{3}\right)$ D) $\left(-\frac{4}{3}, \infty\right)$

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? 57) _____

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

B) $C(x) = \begin{cases} 20 \text{ if } 0 < x \le 1 \\ 25 \text{ if } 1 < x \le 2 \\ 30 \text{ if } 2 < x \le 3 \\ 35 \text{ if } 3 < x \le 4 \\ 40 \text{ if } 4 < x \le 5 \end{cases}$; Yes

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

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

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

58) $y = x^2 + 6x$ between x = 4 and x = 8 58) _____

A) 28 B) 14 C) 9 D) 18

59) $y = 5x^3 - 5x^2 - 7$ between x = –9 and x = –4 59) _____

A) $-\frac{407}{5}$ B) $-\frac{1825}{2}$ C) $\frac{407}{4}$ D) 730

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

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

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

A) 11 B) 9 C) 4 D) 22

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

62) Find the instantaneous rate of change for the function $x^2 + 7x$ at x = 8. 62) _____

A) 23 B) 15 C) 16 D) 120

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

A) –14 B) –41 C) 6 D) –39

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Provide an appropriate response.

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

A) $5h^2 - 3h$ B) $5h - 3$ C) $10x - 3$ D) $10x + 5h - 3$

65) Use the four step process to find f'(x) for the function $f(x) = \frac{2}{x^2}$. 65) _____

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

C) $\frac{(h + 2x)}{x^2(x + h)^2}$ D) $\frac{2(h + x)}{x^2(x + h)^2}$

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

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

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

Use the definition $f'(x) = \lim_{h \to 0} \frac{f(x + h) - f(x)}{h}$ to find the derivative at x.

67) $f(x) = 13x - 12$ 67) _____

A) 13 B) –13 C) 13x D) 1

68) $f(x) = 6 - 6x^2$ 68) _____

A) $6 - 6x$ B) $6 - 12x$ C) $-12x^2$ D) $-12x$

69) $f(x) = 4x - 3x^3$ 69) _____

A) $4 - 9x^2$ B) $4 - 3x^2$ C) $4x - 9x^2$ D) $4x - 9x^3$

Provide an appropriate response.

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

A) –55 B) –15 C) 55 D) 15

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

A) 1 B) –1 C) 2 D) –2

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

$y = x^4 + 2x^3 + 2x + 2$ at $x = -3$

A) 65 B) 67 C) –50 D) –52

73) Given $f(x + h) - f(x) = 4xh + 4h + 2h^2$, find the slope of the tangent line at $x = 4$. 73) _____

A) 8 B) 20 C) 16 D) 22

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

74) $f(x) = -3 - x^2$; $x = 7$ 74) _____

A) $y = -2x$ B) $y = 7x + 46$ C) $y = -14x + 46$ D) $y = 14x - 46$

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

$f(x) = x^2 + 5x$ at $x = 4$

A) $y = -\frac{4}{25}x + \frac{8}{5}$ B) $y = \frac{1}{20}x + \frac{1}{5}$ C) $y = 13x - 16$ D) $y = -39x - 80$

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. 76) _____

A) 84 m/s B) 15 m/s C) 12 m/s D) 3 m/s

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. 77) _____

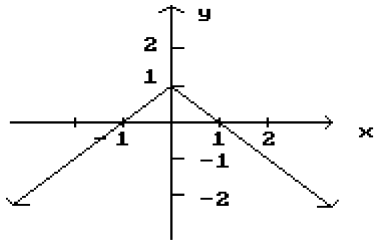
A) 12 – h m/s B) 12 + h m/s C) 7 – h m/s D) 7 + h m/s

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. 78) _____

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

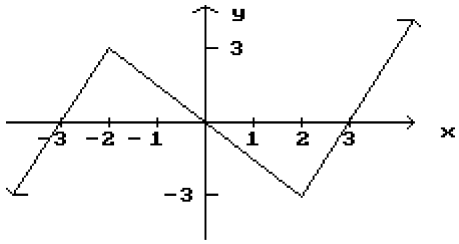
List the x–values in the graph at which the function is not differentiable.

79) 79) _____



A) x = –1 B) x = 0 C) x = 1 D) x = 2

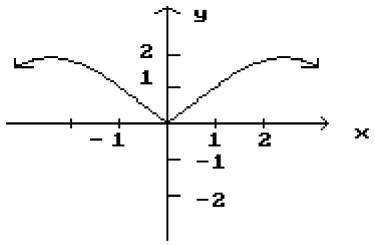
80) 80) _____



A) x = –3, x = 3 B) x = –2, x = 0, x = 2

C) x = –2, x = 2 D) x = –3, x = 0, x = 3

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81) 

81) _____

A) x = 0
B) x = 2
C) x = –2, x = 0, x = 2
D) x = –2, x = 2

Solve the problem.

82) If an object moves along a line so that it is at $y = f(x) = 3x^2 - 2x + 5$ at time x (in seconds), find the instantaneous velocity function v = f'(x). 82) _____

A) $3x^2 - 2$ B) $6x^2 - 2$ C) $6x - 2$ D) $3x - 2$

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). 83) _____

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

84) The electric power p (in W) as a function of the current i (in A) in a certain circuit is given by $p(i) = 25i^2 + 70i$. Find the instantaneous rate of change of p with respect to i for i = 0.7 A. 84) _____

A) 84 W/A B) 61.25 W/A C) 87.5 W/A D) 105 W/A

Provide an appropriate response.

85) Find f'(x) if $f(x) = \pi$. 85) _____

A) $f'(x) = \pi^2$ B) f'(x) = 0 C) $f'(x) = \pi$ D) f'(x) = 1

86) Find y' if $y = \frac{5}{8}$. 86) _____

A) 1 B) $\frac{5}{8}x$ C) 0 D) $\frac{5}{8}$

87) Find y' if y = 6x. 87) _____

A) x B) 6 C) x^2 D) 0

88) Find f'(x) for $f(x) = 2x^5 + 6x^8$. 88) _____

A) $2x^4 + 6x^7$ B) $10x^4 + 48x^7$ C) $10x^3 + 48x^2$ D) $10x^6 + 48x^9$

89) Find the derivative of $y = \frac{3x^5 - 7x^2 - 4}{x^2}$. 89) _____

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

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. 90) _____

A) 5 B) 11 C) 2 D) 9

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91) Find f'(x) if $f(x) = 3x^4 + 6x^7$. 91) _____

A) $4x^3 + 7x^6$ B) $7x^3 + 13x^6$ C) $3x^5 + 7x^8$ D) $12x^3 + 42x^6$

92) Find f'(x) if $f(x) = 6x^{-2} + 8x^3 + 11x$. 92) _____

A) $f'(x) = -12x^{-3} + 24x^2$ B) $f(x) = -12x^{-1} + 24x^2$

C) $f'(x) = -12x^{-1} + 24x^2 + 11$ D) $f'(x) = -12x^{-3} + 24x^2 + 11$

93) Find f'(x) if $f(x) = 9x^{7/5} - 5x^2 + 10000$. 93) _____

A) $f'(x) = \frac{63}{5}x^{6/5} - 10x$ B) $f'(x) = \frac{63}{5}x^{6/5} - 10x + 4000$

C) $f'(x) = \frac{63}{5}x^{2/5} - 10x + 4000$ D) $f'(x) = \frac{63}{5}x^{2/5} - 10x$

94) Find: $\frac{d}{dx}\left(\frac{4}{x^4} - 4\sqrt[5]{x}\right)$ 94) _____

A) $-\frac{16}{x^5} - \frac{4}{5\sqrt[5]{x^4}}$ B) $-\frac{16}{x^3} - \frac{4}{5}\sqrt[4]{x}$ C) $\frac{1}{x^3} - \frac{4}{5}\sqrt[4]{x}$ D) $\frac{16}{x^3} - 20\sqrt[4]{x}$

95) Find: $\frac{dy}{dt}$ if $y = 3t^{-4} - 5t^{-1}$ 95) _____

A) $-\frac{12}{t^5} - \frac{5}{t^2}$ B) $-12t^{-5} - 5t^{-2}$ C) $-12t^5 - 5t^2$ D) $-12t^{-5} + 5t^{-2}$

96) Find: $\frac{d}{dx}\left(\frac{4}{x^4} - 5\sqrt[3]{x}\right)$ 96) _____

A) $\frac{1}{4x^3} - \frac{5}{3}x^{-2/3}$ B) $-16x^{-5} - \frac{5}{3}x^{-2/3}$

C) $\frac{1}{x^3} + \frac{5}{3}x^{-4/3}$ D) $\frac{1}{4}x^{-5} - 15x^{2/3}$

97) Find $\frac{d}{dv}(6v^{0.7} - v^{5.8})$ 97) _____

A) $4.2v^{-0.3} - 5.8v^{-4.8}$ B) $4.2v^{-0.3} - 5.8v^{-4.7}$

C) $4.2v^{-0.3} - 5.8v^{4.8}$ D) $4.2v^{-0.3} - 5.8v^{4.7}$

98) Find $\frac{dy}{dx}$ for $y = \frac{1}{3x^3} + \frac{x^7}{10}$. 98) _____

A) $-x^{-4} + \frac{7}{10}x^6$ B) $\frac{1}{9x^2} + \frac{7x^6}{10}$ C) $\frac{7x^6}{9x^2 + 10}$ D) $-x^{-2} + \frac{7}{10}x^7$

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

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

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

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

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

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

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 $y = mx + b$. 102) _____

A) $y = -43x + 60$ B) $y = -47x + 68$ C) $y = -43x + 48$ D) $y = -39x + 52$

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. 103) _____

A) 192 feet per second B) 197 feet per second
C) 190 feet per second D) 109 feet per second

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

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

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

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

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

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

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

A) 20 items per hour B) 45 items per hour
C) 5 items per hour D) 60 items per hour

Find Δy for the given values of x_1 and x_2.

106) $y = 2x + 3; \ x = 18, \Delta x = 0.5$ 106) _____

A) 0.5 B) 1 C) 0.1 D) 5

Find dy.

107) $y = 7x^2 + 3x + 3$ 107) _____

A) 14x dx B) 14x + 6 dx C) 14x + 3 dx D) (14x + 3) dx

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108) $y = x\sqrt{5x + 4}$ 108) _____

A) $\frac{15x + 8}{\sqrt{5x + 4}}\,dx$ B) $\frac{15x - 8}{2\sqrt{5x + 4}}\,dx$ C) $\frac{15x - 8}{\sqrt{5x + 4}}\,dx$ D) $\frac{15x + 8}{2\sqrt{5x + 4}}\,dx$

Provide an appropriate response.

109) Evaluate dy and $\triangle y$ for $y = f(x) = x^2 - 7x + 5$, $x = 7$, and $dx = \triangle x = 0.5$. 109) _____

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) $dy = 3.75$; $\triangle y = 3.5$

110) Evaluate dy and $\triangle y$ for $y = f(x) = 20 + 15x^2 - x^3$, $x = 2$, and $dx = \triangle x = 0.3$. 110) _____

A) $dy = 14.4$; $\triangle y = 14.4$ B) $dy = 15.183$; $\triangle y = 15.183$

C) $dy = 15.183$; $\triangle y = 14.4$ D) $dy = 14.4$; $\triangle y = 15.183$

111) A spherical balloon is being inflated. Find the approximate change in volume if the radius increases from 6.1 cm to 6.3 cm. (Recall that $V = \frac{4}{3}\pi r^3$.) 111) _____

A) 148.84π cm^3 B) 29.768π cm^3 C) 0.976π cm^3 D) 302.64 cm^3

Solve the problem.

112) A cube 4 inches on an edge is given a protective coating 0.2 inches thick. About how much coating should a production manager order for 800 cubes? 112) _____

A) About 7,680 in.^{2} B) About 2,560 in.^{2}

C) About 10,240 in.^{3} D) About 15,360 in.^{3}

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 $T = x^2\left(1 - \frac{x}{8}\right)$, where $0 \le x \le 3$. Approximate the changes in body temperature produced by changing the drug dosage from 1 to 1.8 milligrams. Round to the nearest hundredth when necessary. 113) _____

A) 0.25°F B) 1.63°F C) 2.93°F D) 1.3°F

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 π.) 114) _____

A) 1.5 cm^3 B) 1.1 cm^3 C) 0.1 cm^3 D) 1.3 cm^3

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 $x = 5$. 115) _____

A) \$32 B) \$35 C) \$15 D) \$45

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 $x = 1000$. 116) _____

A) \$104.00 B) \$4.00 C) \$10,300.00 D) \$4.50

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

$C(x) = 0.0005x^3 - 0.012x^2 + 100x + 30{,}000$

$R(x) = 450x$

A) $C'(x) = 0.0015x^2 - 0.024x + 100$
$R'(x) = 450$
$P'(x) = 0.0015x^2 - 0.024x - 350$

B) $C'(x) = 0.0015x^2 + 0.024x + 100$
$R'(x) = 450$
$P'(x) = 0.0015x^2 + 0.024x + 350$

C) $C'(x) = 0.0015x^2 - 0.024x + 100$
$R'(x) = 450$
$P'(x) = -0.0015x^2 + 0.024x + 350$

118) The total cost to produce x units of paint is $C(x) = (5x + 3)(7x + 4)$. Find the marginal average cost 118) _____
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) $\overline{C}'(x) = 35 - \frac{12}{x^2}$

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

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

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 120) _____
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) -$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.
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) -$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.

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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 $C(x) = 7{,}000 + 4x$. 121) _____

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

A) $4; at the 3,000 level of production, profit will increase by approximately $4 for each unit increase in production.

B) $14; at the 3,000 level of production, profit will increase by approximately $14 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) $16; at the 3,000 level of production, profit will increase by approximately $16 for each unit increase in production.

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. 122) _____

A) $R(x) = 80x - 20x^2$

B) $R(x) = 80x - 20$

C) $R(x) = 80x - \frac{x^2}{20}$

D) $R(x) = 20x + \frac{x^2}{20}$

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

A) $D'(p) = -3p^2 + 3$

B) $D'(p) = -6p^2 + 3$

C) $D'(p) = -6p + 3$

D) $D'(p) = -3p + 3$

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1) A
2) B
3) C
4) C
5) B
6) C
7) B
8) D
9) C
10) D
11) D
12) D
13) C
14) C
15) B
16) D
17) D
18) D
19) B
20) C
21) B
22) C
23) B
24) A
25) D
26) D
27) D
28) C
29) C
30) C
31) A
32) A
33) B
34) D
35) B
36) B
37) C
38) B
39) C
40) C
41) C
42) D
43) A
44) A
45) A
46) A
47) B
48) A
49) C
50) B

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51) C
52) A
53) C
54) D
55) A
56) D
57) B
58) D
59) D
60) D
61) A
62) A
63) D
64) D
65) A
66) B
67) A
68) D
69) A
70) B
71) A
72) D
73) B
74) C
75) C
76) C
77) D
78) A
79) B
80) C
81) A
82) C
83) B
84) D
85) B
86) C
87) B
88) B
89) B
90) D
91) D
92) D
93) D
94) A
95) D
96) B
97) C
98) A
99) B
100) D

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101) C
102) A
103) C
104) B
105) C
106) B
107) D
108) D
109) A
110) D
111) B
112) D
113) D
114) D
115) B
116) B
117) C
118) D
119) C
120) D
121) A
122) C
123) C

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