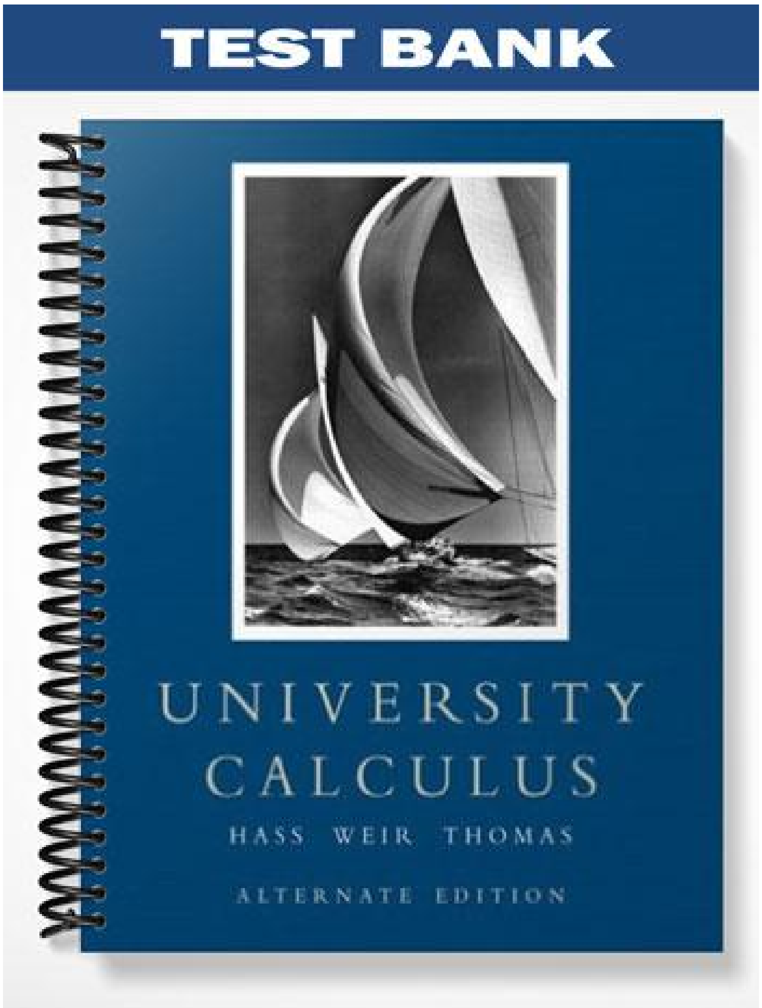

TEST BANK
UNIVERSITY
CALCULUS
HASS WEIR THOMAS
ALTERNATE EDITION

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

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

1) $f(x) = x^2 + 1x$, [2, 5] 1) _______

A) $\frac{24}{5}$ B) 8 C) 10 D) 6

2) $g(x) = 3x^3 - 2x^2 + 8$, [4, 6] 2) _______

A) 208 B) 292 C) $\frac{292}{3}$ D) $\frac{208}{3}$

3) $h(t) = \sqrt{2t}$, [2, 8] 3) _______

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

4) $g(t) = \frac{3}{t - 2}$, [4, 7] 4) _______

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

5) $f(x) = 4x^2$, $\left[0, \frac{7}{4}\right]$ 5) _______

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

6) $g(t) = -3t^2 - t$, [5, 6] 6) _______

A) -34 B) $\frac{1}{2}$ C) -2 D) $-\frac{1}{6}$

7) $h(t) = \sin(2t)$, $\left[0, \frac{\pi}{4}\right]$ 7) _______

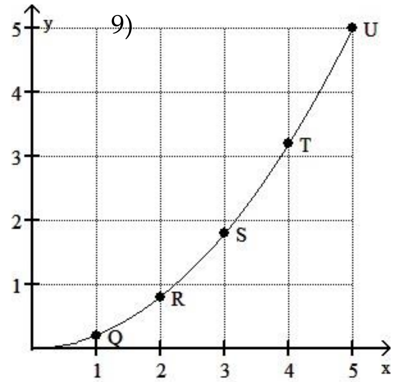
A) $\frac{2}{\pi}$ B) $\frac{4}{\pi}$ C) $\frac{\pi}{4}$ D) $-\frac{4}{\pi}$

8) $g(t) = 5 + \tan t$, $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$ 8) _______

A) $-\frac{16}{11}$ B) $-\frac{4}{\pi}$ C) 0 D) $\frac{4}{\pi}$

Use the slopes of UQ, UR, US, and UT to estimate the rate of change of y at the specified value of x.

9) x = 5

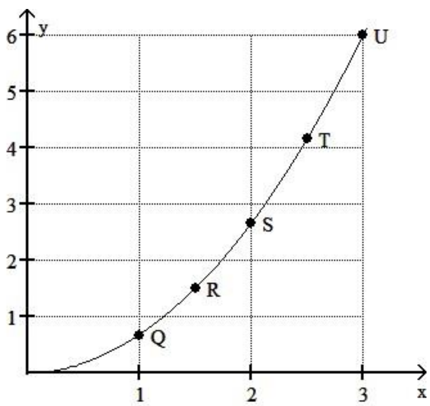


9)

A) 2 B) 0 C) 5 D) 1

10) x = 3

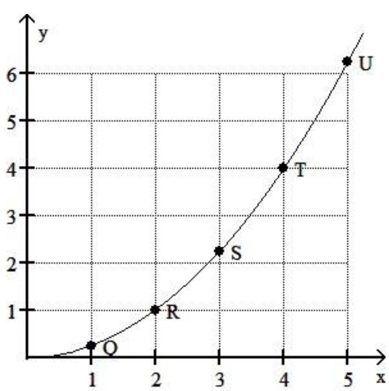
10) ______



A) 4 B) 2 C) 6 D) 0

11) x = 5

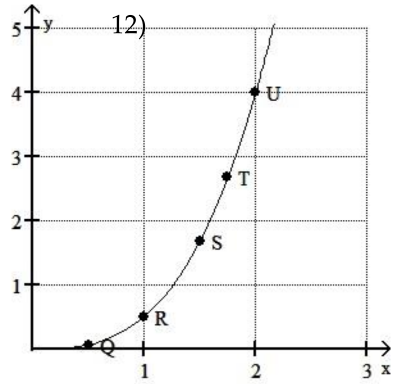
11) ______



A) $\frac{5}{2}$ B) $\frac{25}{4}$ C) 0 D) $\frac{5}{4}$

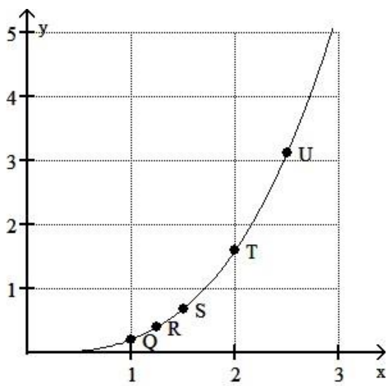
12) x = 2

12)



A) 3 B) 0 C) 6 D) 4

13) $x = 2.5$ 13) ______



A) 7.5 B) 3.75 C) 1.25 D) 0

Find the slope of the curve at the given point P.

14) $y = 4x - 11$, P(4, 5) 14) ______

A) 11 B) -11 C) 4 D) $\frac{1}{4}$

15) $y = x^2 + 5x$, P(4, 20) 15) ______

A) 3 B) 9 C) 13 D) 21

16) $y = 5x^2 + x$, P(-4, 76) 16) ______

A) -14 B) 6 C) -41 D) -39

17) $y = -4x^2 + 7x$, P(5, 65) 17) ______

A) -13 B) -33 C) 33 D) 3

18) $y = 2x^2 + x - 3$, P(4, 33) 18) ______

A) 5 B) 19 C) 17 D) 15

19) $y = x^2 + 11x - 15$, P(1, -3) 19) ______

A) 11 B) -9 C) 26 D) 13

20) $y = x^3 - 5x$, P(1, -4) 20) ______

A) -7 B) 3 C) -2 D) -5

Find an equation of the tangent line at the given point P.

21) $y = x^2 + 5x$, P(4, 36) 21) ______

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

22) $y = 5x^2 + x$, P(-4, 76) 22) ______

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

23) $y = x^2 + 11x - 15$, P(1, -3) 23) ______

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

24) $y = 3x^2 + 5x - 7$, P(-2, -5) 24) ______

A) $y = \frac{1}{4}x + 1$
B) $y = -7x - 19$
C) $y = -7x + 28$
D) $y = \frac{1}{2}x - \frac{1}{2}$

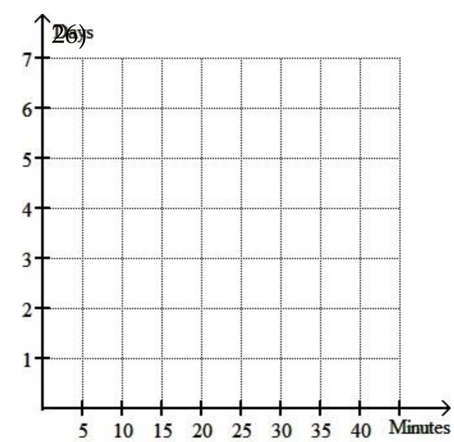
25) $y = x^3 - 9x$, P(1, -8) 25) ______

A) $y = 3x - 7$
B) $y = 3x - 11$
C) $y = -6x$
D) $y = -6x - 2$

Solve the problem.

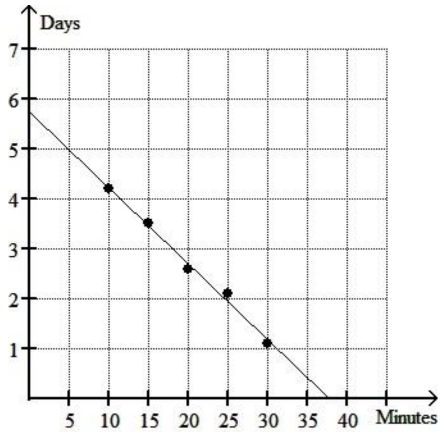
26) When exposed to ethylene gas, green bananas will ripen at an accelerated rate. The number of days for ripening becomes shorter for longer exposure times. Assume that the table below gives average ripening times of bananas for several different ethylene exposure times:

Exposure time (minutes)	Ripening Time (days)
10	4.2
15	3.5
20	2.6
25	2.1
30	1.1



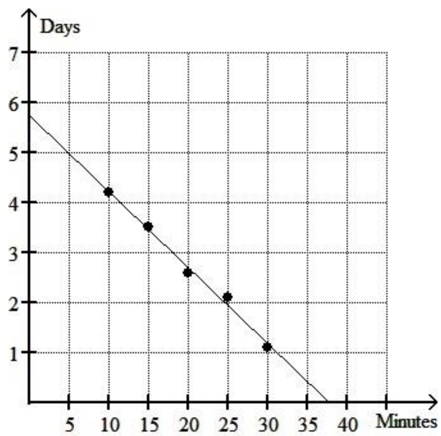
Plot the data and then find a line approximating the data. With the aid of this line, find the limit of the average ripening time as the exposure time to ethylene approaches 0. Round your answer to the nearest tenth.

A)



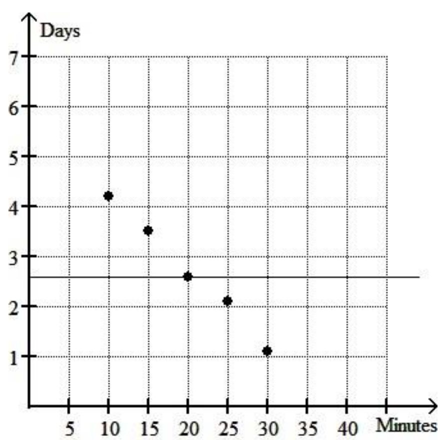
0.1 day

B)



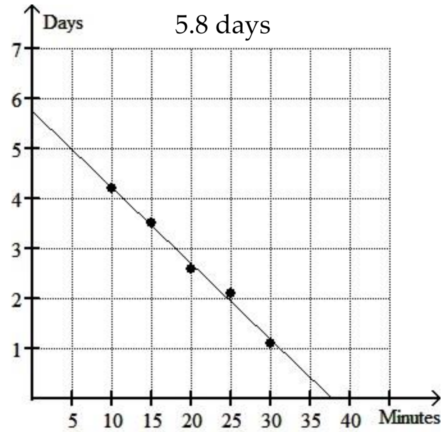
37.5 minutes

C)



2.6 days

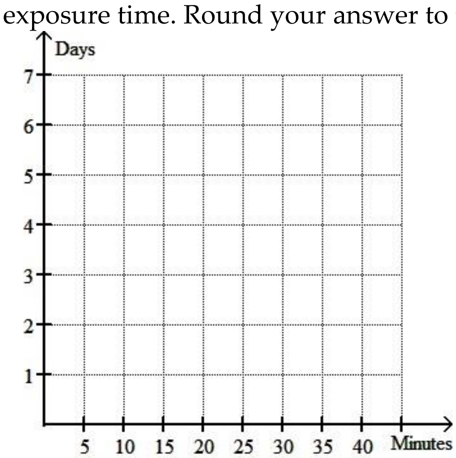
D)



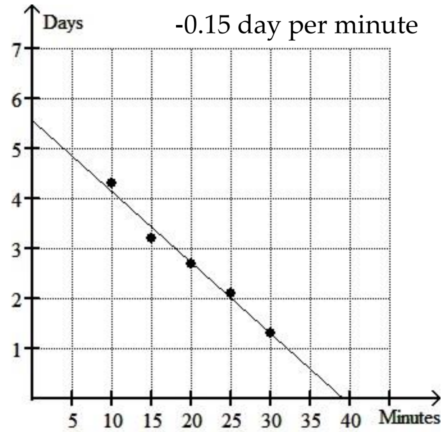
27) When exposed to ethylene gas, green bananas will ripen at an accelerated rate. The number of days for ripening becomes shorter for longer exposure times. Assume that the table below gives average ripening times of bananas for several different ethylene exposure times. 27) ______

Exposure time (minutes)	Ripening Time (days)
10	4.3
15	3.2
20	2.7
25	2.1
30	1.3

Plot the data and then find a line approximating the data. With the aid of this line, determine the rate of change of ripening time with respect to exposure time. Round your answer to two significant digits.

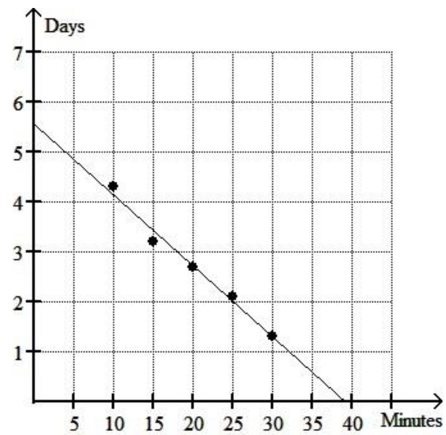


A)



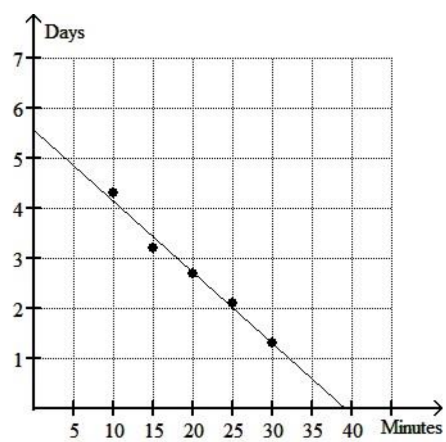
-0.15 day per minute

B)



5.6 days

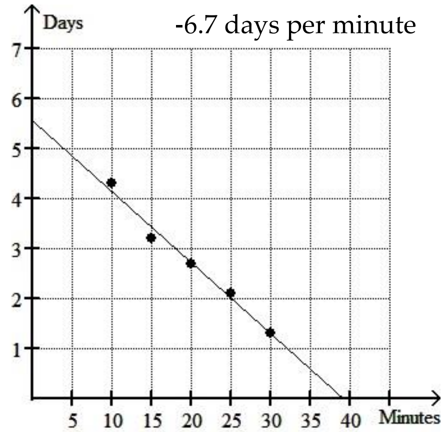
C)



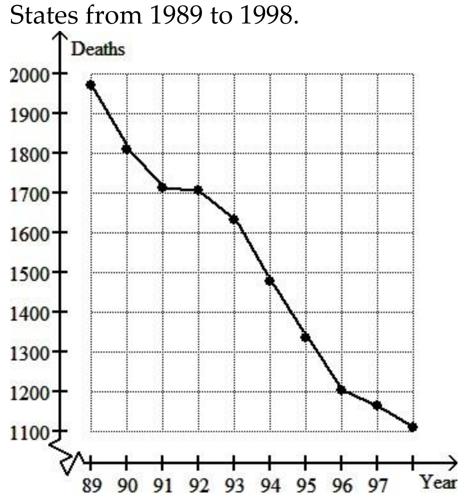
38 minutes

D)

-6.7 days per minute



28) The graph below shows the number of tuberculosis deaths in the United States from 1989 to 1998. 28) ______

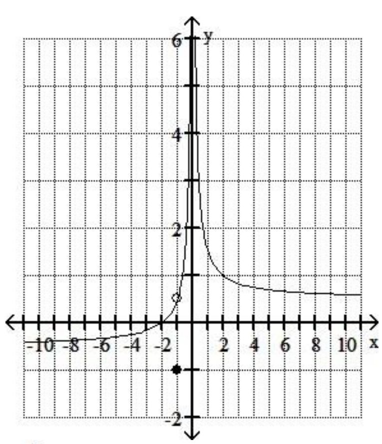


Estimate the average rate of change in tuberculosis deaths from 1996 to 1998.

A) About -0 .5 deaths per year B) About -90 deaths per year
C) About -50 deaths per year D) About -20 deaths per year

Use the graph to evaluate the limit.

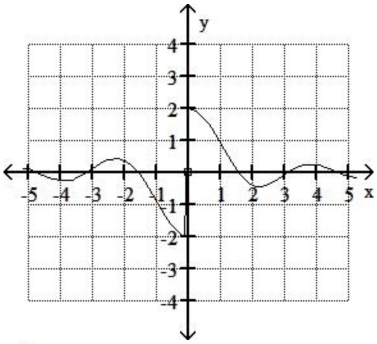
29) 29) ______



$\lim_{x \to -1} f(x)$

A) -1 B) $\frac{1}{2}$ C) ∞ D) $-\frac{1}{2}$

30)

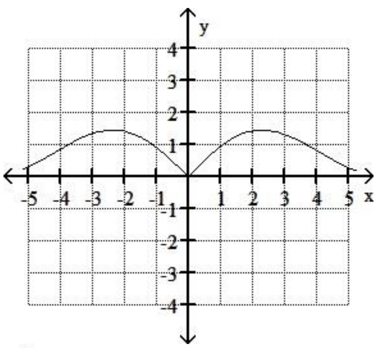


$\lim_{x \to 0} f(x)$

A) 2
B) Does not exist
C) 0
D) -2

30) ______

31)

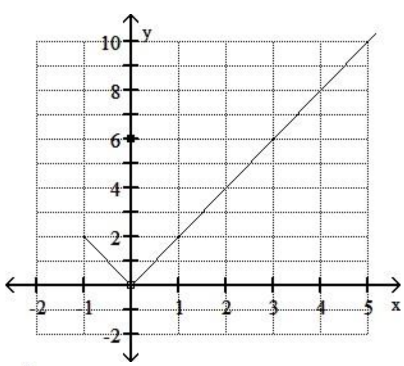


$\lim_{x \to 0} f(x)$

A) 0
B) -2
C) Does not exist
D) 2

31) ______

32)

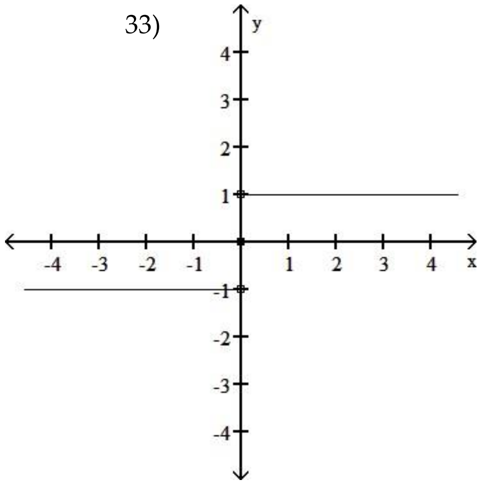


$\lim_{x \to 0} f(x)$

A) 6
B) -1
C) Does not exist
D) 0

32) ______

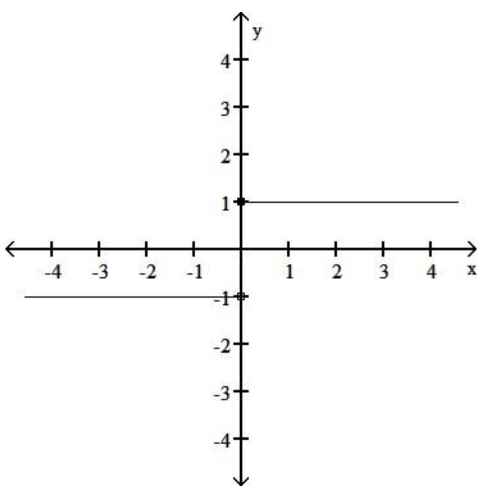
33) $\lim_{x \to 0} f(x)$

33) 

A) -1
B) ∞
C) 1
D) Does not exist

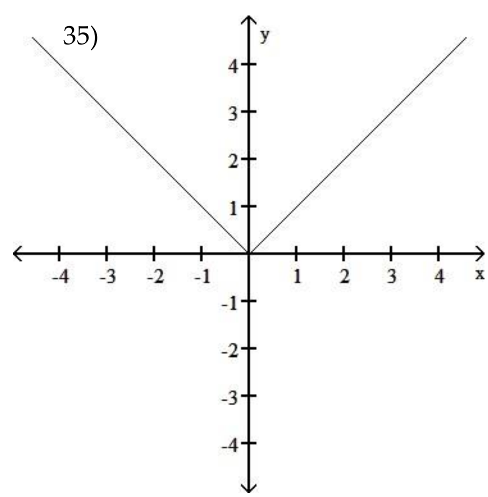
34) $\lim\limits_{x \to 0} f(x)$

34) ______



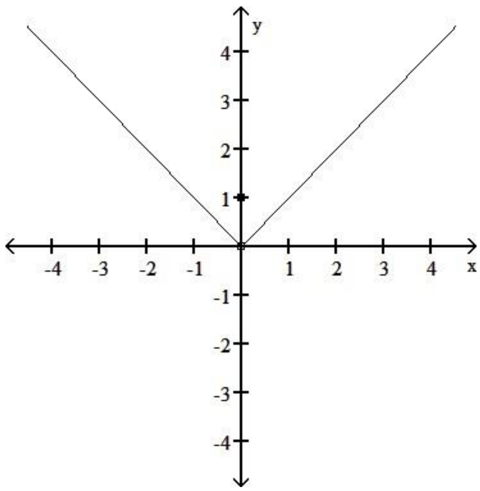
A) Does not exist
B) ∞
C) 1
D) -1

35) $\lim\limits_{x \to 0} f(x)$

35) 

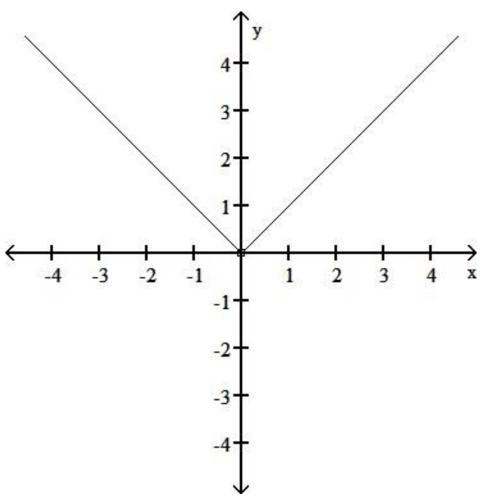
A) 1 B) 0
C) Does not exist D) -1

36) $\lim_{x \to 0} f(x)$ 36) ______



A) Does not exist B) 1
C) 0 D) -1

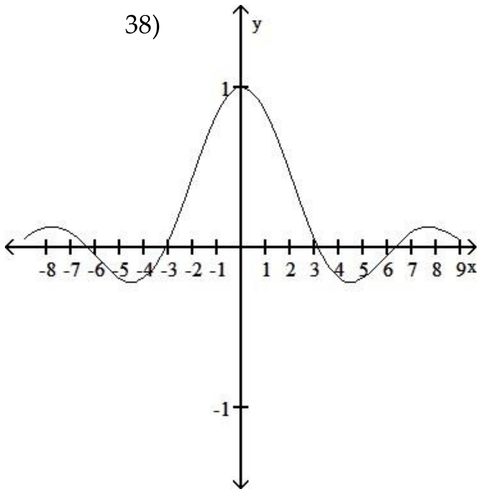
37) $\lim_{x \to 0} f(x)$ 37) ______



A) -1 B) 1
C) 0 D) Does not exist

38) $\lim_{x \to 0} f(x)$

38)



A) 0
B) Does not exist
C) -1
D) 1

Find the limit if it exists.

39) $\lim_{x \to 5} \sqrt{2}$ 39) ______

A) $\sqrt{2}$
B) 2
C) 5
D) $\sqrt{5}$

40) $\lim_{x \to -2} (5x - 3)$ 40) ______

A) -13
B) 13
C) -7
D) 7

41) $\lim_{x \to 15} (10 - 6x)$ 41) ______

A) -80
B) 80
C) -100
D) 100

42) $\lim_{x \to 5} (9x^2 - 9x - 6)$ 42) ______

A) 174
B) 276
C) 264
D) 186

43) $\lim_{x \to 4} 7x(x + 3)(x - 5)$ 43) ______

A) -28
B) -196
C) 1764
D) 196

44) $\lim_{x \to \frac{1}{4}} 8x\left(x - \frac{3}{4}\right)$ 44) ______

A) $-\frac{1}{8}$
B) - 4
C) - 1
D) 2

45) $\lim_{x \to 16} x^{1/2}$ 45) ______

A) 16
B) $\frac{1}{2}$
C) 4
D) 8

46) $\lim_{x \to 2} (x + 1)^2(x - 1)^3$ 46) ______

A) 27 B) 1 C) 9 D) 243

47) $\lim_{x \to 8} \sqrt{10x + 93}$ 47) ______

A) $-\sqrt{173}$ B) -173 C) $\sqrt{173}$ D) 173

48) $\lim_{x \to -8} (x \quad + 0)^{1/3}$ 48) ______

A) 4 B) 1 C) -2 D) 2

Find the limit, if it exists.

49) $\lim_{x \to 20} \frac{1}{x - 20}$ 49) ______

A) 20
B) Does not exist
C) 0
D) 40

50) $\lim_{x \to 0} \frac{x^3 - 6x + 8}{x - 2}$ 50) ______

A) 0
B) 4
C) -4
D) Does not exist

51) $\lim_{x \to 1} \frac{2x - 7}{4x + 5}$ 51) ______

A) $-\frac{7}{5}$
B) Does not exist
C) $-\frac{1}{2}$
D) $-\frac{5}{9}$

52) $\lim_{x \to 1} \frac{3x^2 + 7x - 2}{3x^2 - 4x - 2}$ 52) ______

A) 0
B) Does not exist
C) $-\frac{8}{3}$
D) $-\frac{7}{4}$

53) $\lim_{x \to 6} \frac{x + 6}{(x - 6)^2}$ 53) ______

A) 0
B) 6
C) -6
D) Does not exist

54) $\lim_{x \to 5} \frac{x^2 - 2x - 15}{x + 3}$ 54) ______

A) 0
B) Does not exist
C) 5
D) -8

55) $\lim_{h \to 0} \frac{2}{\sqrt{3h+4} + 2}$ 55) ______

A) 1
B) 2
C) 1/2
D) Does not exist

56)

$\lim_{h \to 0}$ 56)

$\frac{3x + h}{x^3(x - h)}$

A) $\frac{3}{x^4}$

B) Does not exist

C) $3x$

D) $\frac{3}{x^3}$

57) $\lim_{x \to 0} \frac{\sqrt{1 + x} - 1}{x}$ 57) _______

A) 0

B) 1/4

C) Does not exist

D) 1/2

58) $\lim_{h \to 0} \frac{(1+h)^{1/3} - 1}{h}$ 58) _______

A) 1/3

B) Does not exist

C) 3

D) 0

59) $\lim_{x \to 0} \frac{x^3 + 12x^2 - 5x}{5x}$ 59) _______

A) -1

B) 0

C) Does not exist

D) 5

60) $\lim_{x \to 1} \frac{x^4 - 1}{x - 1}$ 60) _______

A) Does not exist

B) 2

C) 0

D) 4

61) $\lim_{x \to 9} \frac{x^2 - 81}{x - 9}$ 61) _______

A) 9

B) Does not exist

C) 18

D) 1

62) $\lim_{x \to -5} \frac{x^2 + 14x + 45}{x + 5}$ 62) _______

A) 140

B) 14

C) 4

D) Does not exist

63) $\lim_{x \to 1} \frac{x^2 + 3x - 4}{x - 1}$ 63) _______

A) 3

B) 5

C) 0

D) Does not exist

64) $\lim_{x \to 1} \frac{x^2 + 3x - 4}{x^2 - 1}$ 64) _______

A) Does not exist

B) $-\frac{3}{2}$

C)

$\frac{5}{2}$ D) 0

65) $\lim_{x \to 5} \frac{x^2 - 25}{x^2 - 7x + 10}$ 65) ______

A) $\frac{10}{3}$ B) Does not exist

C) 0 D) $\frac{5}{3}$

66) $\lim_{x \to 5} \frac{x^2 - 2x - 15}{x^2 - 7x + 10}$ 66) ______

A) $\frac{8}{3}$ B) $\frac{2}{3}$

C) Does not exist D) $-\frac{8}{3}$

67) $\lim_{h \to 0} \frac{(x + h)^3 - x^3}{h}$ 67) ______

A) 0 B) Does not exist

C) $3x^2$ D) $3x^2 + 3xh + h^2$

68) $\lim_{x \to 10} \frac{|10 - x|}{10 - x}$ 68) ______

A) -1 B) 1

C) 0 D) Does not exist

Find the limit.

69) $\lim_{x \to 0} \frac{5x - 3 \sin x}{x}$ 69) ______

A) 0 B) 8

C) 2 D) Does not exist

70) $\lim_{x \to 0} \frac{9 \sin x}{2x}$ 70) ______

A) 1 B) $\frac{9}{2}$

C) 0 D) Does not exist

71) $\lim_{x \to 0} \frac{6x}{2 \sin x}$ 71) ______

A) 1 B) 3

C) 0 D) Does not exist

72) $\lim_{x \to 0} \frac{2 \tan x}{10x}$ 72) ______

A) 0 B) 1

C) $\frac{1}{5}$ D) Does not exist

73) $\lim_{x \to 0} \frac{\sin^6 x}{x^6}$ 73) ______

A) 6 B) 1
C) 0 D) Does not exist

74) $\lim_{x \to 0} \frac{\sin^2 x}{2x}$ 74) ______

A) 1 B) 0
C) $\frac{1}{2}$ D) Does not exist

Give an appropriate answer.

75) Suppose $\lim_{x \to 0} f(x) = 1$ and $\lim_{x \to 0} g(x) = -3$. Name the limit rules that are used to accomplish steps (a), (b), and (c) of the following calculation. 75) ______

$$\lim_{x \to 0} \frac{-1f(x) - 3g(x)}{(f(x) + 3)^{1/2}} \overset{(a)}{=} \frac{\lim_{x \to 0} (-1f(x) - 3g(x))}{\lim_{x \to 0} (f(x) + 3)^{1/2}}$$

$$\overset{(b)}{=} \frac{\lim_{x \to 0} -1f(x) - \lim_{x \to 0} 3g(x)}{\left(\lim_{x \to 0} (f(x) + 3)\right)^{1/2}} \overset{(c)}{=} \frac{-1 \lim_{x \to 0} f(x) - 3 \lim_{x \to 0} g(x)}{\left(\lim_{x \to 0} f(x) + \lim_{x \to 0} 3\right)^{1/2}}$$

$$= \frac{-1 + 9}{(1 + 3)^{1/2}} = 4$$

A) (a) Difference Rule
(b) Power Rule
(c) Sum Rule

B) (a) Quotient Rule
(b) Difference Rule, Sum Rule
(c) Constant Multiple Rule and Power Rule

C) (a) Quotient Rule
(b) Difference Rule
(c) Constant Multiple Rule

D) (a) Quotient Rule
(b) Difference Rule, Power Rule
(c) Constant Multiple Rule and Sum Rule

76) Let $\lim_{x \to -10} f(x) = 5$ and $\lim_{x \to -10} g(x) = 1$. Find $\lim_{x \to -10} [f(x) - g(x)]$. 76) ______

A) 5 B) -10 C) 4 D) 6

77) Let $\lim_{x \to 6} f(x) = -4$ and $\lim_{x \to 6} g(x) = -1$. Find $\lim_{x \to 6} [f(x) \cdot g(x)]$. 77) ______

A) -5 B) -1 C) 4 D) 6

78) Let $\lim_{x \to 10} f(x) = -1$ and $\lim_{x \to 10} g(x) = 9$. Find $\lim_{x \to 10} \frac{f(x)}{g(x)}$. 78) ______

A) -

$\frac{1}{9}$ B) - 9 C) -10 D) 10

79) Let $\lim_{x \to 5} f(x) = 8$. Find $\lim_{x \to 5} \log_2 f(x)$. 79) ______

A) 5 B) 9 C) 3 D) $\frac{3}{2}$

80) Let $\lim_{x \to -10} f(x) = 144$. Find $\lim_{x \to -10} \sqrt{f(x)}$. 80) ______

A) 144 B) -10 C) 3.4641 D) 12

81) Let $\lim_{x \to 7} f(x) = 2$ and $\lim_{x \to 7} g(x) = 4$. Find $\lim_{x \to 7} [f(x) + g(x)]^2$. 81) ______

A) 36 B) -2 C) 6 D) 20

82) Let $\lim_{x \to 9} f(x) = 4$. Find $\lim_{x \to 9} (-2)^{f(x)}$. 82) ______

A) 4 B) 16 C) -512 D) -2

83) Let $\lim_{x \to 9} f(x) = 81$. Find $\lim_{x \to 9} \sqrt[4]{f(x)}$. 83) ______

A) 3 B) 9 C) 81 D) 4

84) Let $\lim_{x \to 7} f(x) = 3$ and $\lim_{x \to 7} g(x) = 7$. Find $\lim_{x \to 7} \left[\frac{6f(x) - 10g(x)}{-4 + g(x)}\right]$. 84) ______

A) 7 B) $\frac{88}{3}$ C) $-\frac{29}{2}$ D) $-\frac{52}{3}$

Evaluate $\lim_{h \to 0} \frac{f(x + h) - f(x)}{h}$ for the given x and function f.

85) $f(x) = 5x^2$ for $x = -1$ 85) ______

A) -10 B) 5

C) -5 D) Does not exist

86) $f(x) = 2x^2 - 4$ for $x = -2$ 86) ______

A) -8 B) -12

C) 8 D) Does not exist

87) $f(x) = -5x + 4$ for $x = 4$ 87) ______

A) -16 B) -5

C) -20 D) Does not exist

88) $f(x) = \frac{x}{3} + 6$ for $x = 5$ 88) ______

A) $\frac{5}{3}$ B) $\frac{1}{3}$

C) $\frac{23}{3}$ D) Does not exist

89) $f(x) = \frac{3}{x}$ for x = 5 89) ______

A) $\frac{3}{5}$ B) $-\frac{3}{25}$

C) -15 D) Does not exist

90) $f(x) = 2\sqrt{x}$ for x = 16 90) ______

A) 16 B) $\frac{1}{4}$

C) 4 D) Does not exist

91) $f(x) = \sqrt{x}$ for x = 13 91) ______

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

C) $\frac{\sqrt{13}}{26}$ D) Does not exist

92) $f(x) = 3\sqrt{x} + 2$ for x = 9 92) ______

A) $\frac{9}{2}$ B) $\frac{27}{2}$

C) $\frac{1}{2}$ D) Does not exist

Provide an appropriate response.

93) It can be shown that the inequality 93) ______

$-x \le x \cos\left(\frac{1}{x}\right) \le x$

holds for all values of $x \ge 0$. Find $\lim_{x\to 0} x \cos\left(\frac{1}{x}\right)$ if it exists.

A) 1 B) 0

C) 0.0007 D) Does not exist

94) The inequality 94) ______

$1 - \frac{x^2}{2} < \frac{\sin x}{x} < 1$

holds when x is measured in radians and $|x| < 1$. Find $\lim_{x\to 0} \frac{\sin x}{x}$ if it exists.

A) 0 B) 1

C) 0.0007 D) Does not exist

95) If $x^3 \le f(x) \le x$ for x in [-1, 1], find $\lim_{x\to 0} f(x)$ if it exists. 95) ______

A) 0 B) -1

C) 1 D) Does not exist

Use the table to find the indicated limit.

96) If f(x) =

$x^2 + 8x -$ 96)
2, find
$\lim_{x \to 2}$
f(x).

x	1.9	1.99	1.999	2.001	2.01	2.1
f(x)						

A)

x	1.9	1.99	1.999	2.001	2.01	2.1
f(x)	16.692	17.592	17.689	17.710	17.808	18.789

; limit = 17.70

B)

x	1.9	1.99	1.999	2.001	2.01	2.1
f(x)	5.043	5.364	5.396	5.404	5.436	5.763

; limit = 5.40

C)

x	1.9	1.99	1.999	2.001	2.01	2.1
f(x)	16.810	17.880	17.988	18.012	18.120	19.210

; limit = 18.0

D)

x	1.9	1.99	1.999	2.001	2.01	2.1
f(x)	5.043	5.364	5.396	5.404	5.436	5.763

; limit = ∞

97) If $f(x) = \frac{x^4 - 1}{x - 1}$, find $\lim_{x \to 1}$ f(x). 97) ______

x	0.9	0.99	0.999	1.001	1.01	1.1
f(x)						

A)

x	0.9	0.99	0.999	1.001	1.01	1.1
f(x)	1.032	1.182	1.198	1.201	1.218	1.392

; limit = ∞

B)

x	0.9	0.99	0.999	1.001	1.01	1.1
f(x)	3.439	3.940	3.994	4.006	4.060	4.641

; limit = 4.0

C)

x	0.9	0.99	0.999	1.001	1.01	1.1
f(x)	4.595	5.046	5.095	5.105	5.154	5.677

; limit = 5.10

D)

x	0.9	0.99	0.999	1.001	1.01	1.1
f(x)	1.032	1.182	1.198	1.201	1.218	1.392

; limit = 1.210

98) If $f(x) = \frac{x - 4}{\sqrt{x} - 2}$, find $\lim_{x \to 4}$ f(x). 98) ______

x	3.9	3.99	3.999	4.001	4.01	4.1
f(x)						

A)

x	3.9	3.99	3.999	4.001	4.01	4.1
f(x)	5.07736	5.09775	5.09978	5.10022	5.10225	5.12236

; limit = 5.10

B)

x	3.9	3.99	3.999	4.001	4.01	4.1
f(x)	3.97484	3.99750	3.99975	4.00025	4.00250	4.02485

; limit = 4.0

C)

x	3.9	3.99	3.999	4.001	4.01	4.1
f(x)	1.19245	1.19925	1.19993	1.20007	1.20075	1.20745

; limit = ∞

D)

x	3.9	3.99	3.999	4.001	4.01	4.1
f(x)	1.19245	1.19925	1.19993	1.20007	1.20075	1.20745

; limit = 1.20

99) If $f(x) = x^2 - 5$, find $\lim\limits_{x \to 0} f(x)$. 99) ______

x	−0.1	−0.01	−0.001	0.001	0.01	0.1
f(x)						

A)

x	−0.1	−0.01	−0.001	0.001	0.01	0.1
f(x)	−1.4970	−1.4999	−1.5000	−1.5000	−1.4999	−1.4970

; limit = -15.0

B)

x	−0.1	−0.01	−0.001	0.001	0.01	0.1
f(x)	−1.4970	−1.4999	−1.5000	−1.5000	−1.4999	−1.4970

; limit = ∞

C)

x	−0.1	−0.01	−0.001	0.001	0.01	0.1
f(x)	−2.9910	−2.9999	−3.0000	−3.0000	−2.9999	−2.9910

; limit = -3.0

D)

x	−0.1	−0.01	−0.001	0.001	0.01	0.1
f(x)	−4.9900	−4.9999	−5.0000	−5.0000	−4.9999	−4.9900

; limit = -5.0

100) If $f(x) = \dfrac{\sqrt{x+1}}{x+1}$, find $\lim\limits_{x \to 1} f(x)$. 100) _____

x	0.9	0.99	0.999	1.001	1.01	1.1
f(x)						

A)

x	0.9	0.99	0.999	1.001	1.01	1.1
f(x)	0.72548	0.70888	0.70728	0.70693	0.70535	0.69007

; limit = 0.7071

B)

x	0.9	0.99	0.999	1.001	1.01	1.1
f(x)	0.21764	0.21266	0.21219	0.21208	0.21160	0.20702

; limit = 0.21213

C)

x	0.9	0.99	0.999	1.001	1.01	1.1
f(x)	0.21764	0.21266	0.21219	0.21208	0.21160	0.20702

; limit = ∞

D)

x	0.9	0.99	0.999	1.001	1.01	1.1
f(x)	2.15293	2.13799	2.13656	2.13624	2.13481	2.12106

; limit = 2.13640

101) If $f(x) = \sqrt{x} - 2$, find $\lim_{x \to 4} f(x)$. 101) _____

x	3.9	3.99	3.999	4.001	4.01	4.1
f(x)						

A)

x	3.9	3.99	3.999	4.001	4.01	4.1
f(x)	3.9000	2.9000	1.9000	2.0000	3.0000	4.0000

; limit = 1.95

B)

x	3.9	3.99	3.999	4.001	4.01	4.1
f(x)	3.9000	2.9000	1.9000	2.0000	3.0000	4.0000

; limit = ∞

C)

x	3.9	3.99	3.999	4.001	4.01	4.1
f(x)	−0.02516	−0.00250	−0.00025	0.00025	0.00250	0.02485

; limit = 0.0

D)

x	3.9	3.99	3.999	4.001	4.01	4.1
f(x)	1.47736	1.49775	1.49977	1.50022	1.50225	1.52236

; limit = 1.50

102) If $f(x) = \frac{x + 4}{x^2 + 6x + 8}$, find $\lim_{x \to -4} f(x)$. 102) _____

x	−4.1	−4.01	−4.001	−3.999	−3.99	−3.9
f(x)						

A) -0.4762; -0.4975; -0.4998; -0.5003; -0.5025; -0.5263

limit = -0.5

B) -0.5762; -0.5975; -0.5998; -0.6003; -0.6025; -0.6263

limit = -0.6

C) -0.3762; -0.3975; -0.3998; -0.4003; -0.4025; -0.4263

limit = -0.4

D) 0.4762; 0.4975; 0.4998; 0.5003; 0.5025; 0.5263

limit = 0.5

103) If $f(x) = \frac{x^2 + 2x - 15}{x^2 + 3x - 10}$, find $\lim_{x \to -5} f(x)$.

x	−5.1	−5.01	−5.001	−4.999	−4.99	−4.9
f(x)						

103) _____

A) 1.1408; 1.1427; 1.1428; 1.1429; 1.1431; 1.1449
limit = 1.1429

B) 1.0408; 1.0427; 1.0428; 1.0429; 1.0431; 1.0449
limit = 1.0429

C) 1.2408; 1.2427; 1.2428; 1.2429; 1.2431; 1.2449
limit = 1.2429

D) 0.6552; 0.6656; 0.6666; 0.6668; 0.6678; 0.6774
limit = 0.6667

104) If $f(x) = \frac{\sin(6x)}{x}$, find $\lim_{x \to 0} f(x)$. 104) _____

x	−0.1	−0.01	−0.001	0.001	0.01	0.1
f(x)		5.99640065			5.99640065	

A) limit = 0
B) limit = 6
C) limit = 5.5
D) limit does not exist

105) If $f(x) = \frac{\cos(4x)}{x}$, find $\lim_{x \to 0} f(x)$. 105) _____

x	−0.1	−0.01	−0.001	0.001	0.01	0.1
f(x)	−9.2106099					9.2106099

A) limit = 9.2106099
B) limit does not exist
C) limit = 0
D) limit = 4

Provide an appropriate response.

106) If $\lim_{x\to 3} \frac{f(x) - 2}{x - 2} = 4$, find $\lim_{x\to 3} f(x)$. 106) _____

A) 3
B) 12
C) 6
D) Does not exist

107) If $\lim_{x\to 2} \frac{f(x)}{x} = 3$, find $\lim_{x\to 2} f(x)$. 107) _____

A) 2
B) 3
C) 6
D) Does not exist

108) If $\lim_{x\to 2} \frac{f(x)}{x^2} = 4$, find $\lim_{x\to 2} \frac{f(x)}{x}$. 108) _____

A) 4
B) 16
C) 2
D) 8

109) If $\lim_{x\to 0} \frac{f(x)}{x} = 1$, find $\lim_{x\to 0} f(x)$. 109) _____

A) 2
B) 0
C) 1
D) Does not exist

110) If $\lim_{x\to 0} \frac{f(x)}{x^2} = 1$, find $\lim_{x\to 0} \frac{f(x)}{x}$. 110) _____

A) 1
B) 0
C) 2
D) Does not exist

111) If

$\lim_{x \to 1}$ 111)

$\frac{f(x) - 3}{x - 1}$

= 2, find
$\lim_{x \to 1}$ f(x)

.

A) 2 B) 1
C) 3 D) Does not exist

Use a CAS to plot the function near the point x_0 being approached. From your plot guess the value of the limit.

112) $\lim_{x \to 25} \frac{\sqrt{x} - 5}{x - 25}$ 112) _____

A) $\frac{1}{10}$ B) 5 C) 0 D) $\frac{1}{5}$

113) $\lim_{x \to 9} \frac{3 - \sqrt{x}}{9 - x}$ 113) _____

A) 3 B) 6 C) 0 D) $\frac{1}{6}$

114) $\lim_{x \to 0} \frac{\sqrt{25 + x} - \sqrt{25 - x}}{x}$ 114) _____

A) 5 B) $\frac{1}{5}$ C) 0 D) $\frac{1}{10}$

115) $\lim_{x \to 0} \frac{\sqrt{81 - x} - 9}{x}$ 115) _____

A) 9 B) $-\frac{1}{18}$ C) $\frac{1}{18}$ D) 18

116) $\lim_{x \to 0} \frac{\sqrt{16 + 2x} - 4}{x}$ 116) _____

A) $\frac{1}{8}$ B) $\frac{1}{2}$ C) $\frac{1}{4}$ D) 16

117) $\lim_{x \to 0} \frac{\sqrt{7 + 7x} - \sqrt{7}}{x}$ 117) _____

A) $\frac{\sqrt{7}}{2}$ B) $\sqrt{7}$ C) 0 D) $\frac{1}{2}$

118) $\lim_{x \to 0} \frac{7 - \sqrt{49 - x^2}}{x}$ 118) _____

A) 14 B) $\frac{1}{14}$ C) $\frac{1}{7}$ D) 0

119)

$\lim_{x\to 3}$ 119)

$\dfrac{x^2 - 9}{\sqrt{x^2 + 7} - 4}$

A) 4 B) $\frac{1}{4}$ C) 8 D) 3

120) $\lim_{x\to -1} \dfrac{x^2 - 1}{\sqrt{x^2 + 3} - 2}$ 120) _____

A) 2 B) $\frac{1}{4}$ C) 1 D) 4

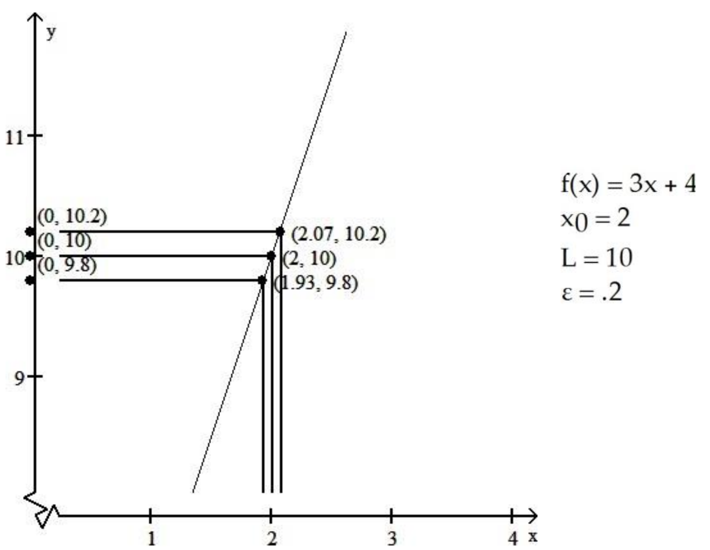
Given the interval (a, b) on the x-axis with the point x_0 inside, find the greatest value for δ > 0 such that for all x, $0 < |x - x_0| < \delta \Rightarrow a < x < b$.

121) a = -3, b = 7, x_0 = 4 121) _____

A) 4 B) 3 C) 1 D) 7

Use the graph to find a δ > 0 such that for all x, $0 < |x - x_0| < \delta \Rightarrow |f(x) - L| < \varepsilon$.

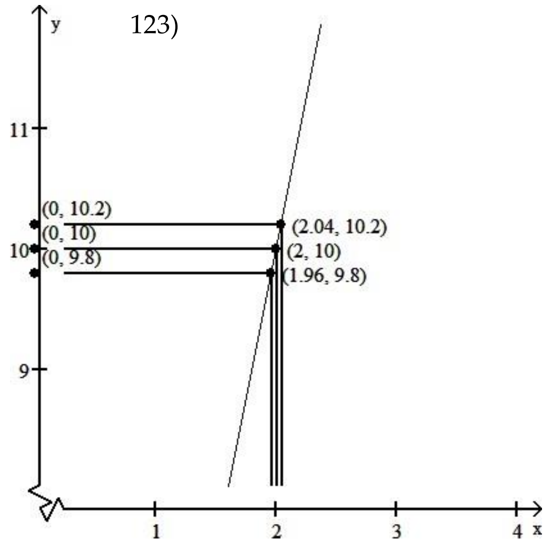
122) 122) _____



A) 0.07 B) 0.4 C) 0.5 D) 8

123)

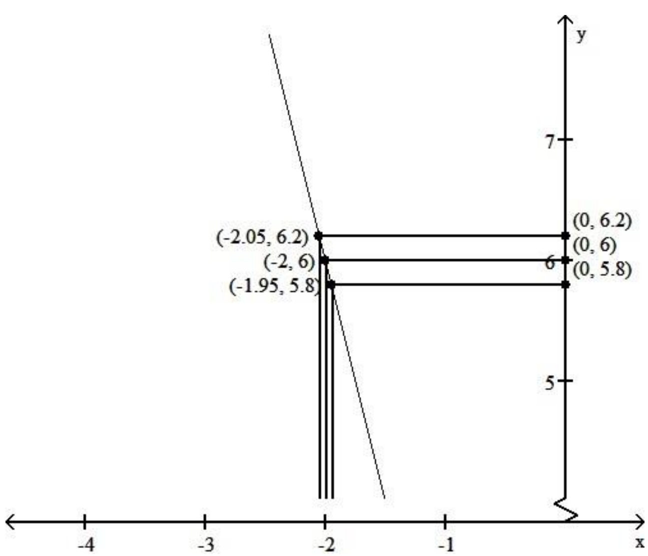
123)



$f(x) = 5x$
$x_0 = 2$
$L = 10$
$\varepsilon = .2$

A) 0.5 B) 8 C) 0.4 D) 0.04

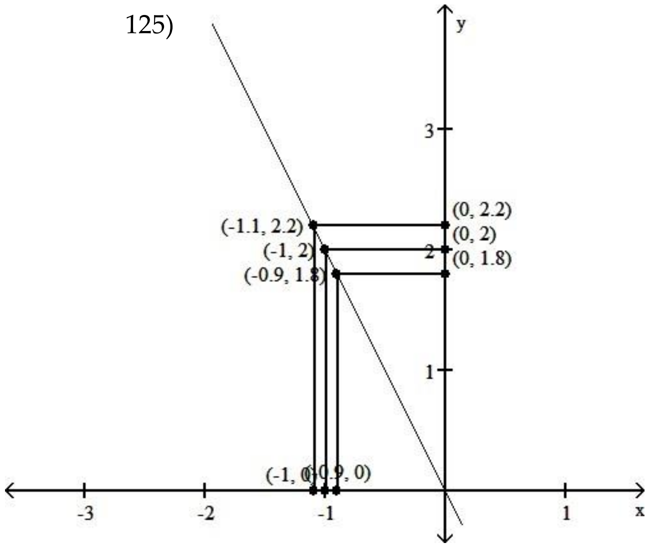
124) 124) _____



$f(x) = -4x - 2$
$x_0 = -2$
$L = 6$
$\varepsilon = .2$

A) 0.4 B) 12 C) 0.05 D) 0.5

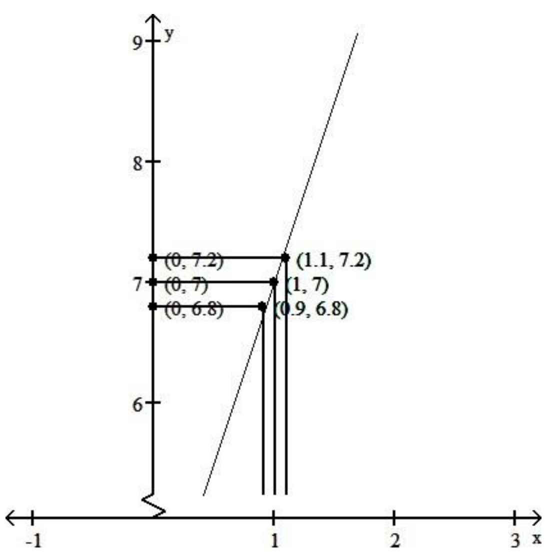
125)

125) 

f(x) = −2x
$x_0 = -1$
L = 2
ε = .2

A) 0.5 B) 3 C) 0.1 D) 0.4

126) 126) _____

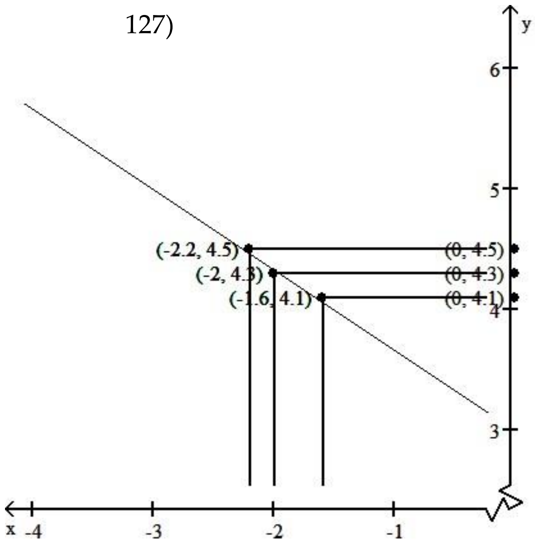


f(x) = 3x + 4
$x_0 = 1$
L = 0.1
ε = .2

A) 0.1 B) 6 C) 0.04 D) 0.02

127)

127)



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

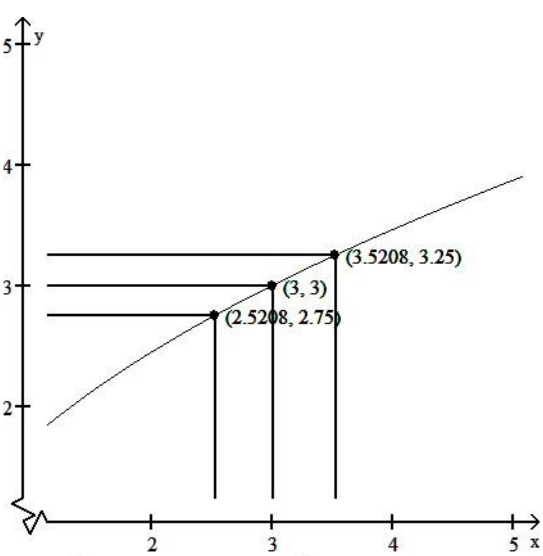
$x_0 = -2$

$L = 0.4$

$\varepsilon = .2$

A) 0.2　　B) 6.3　　C) 0.4　　D) 0.04

128) 128) _____



$f(x) = \sqrt{3x}$

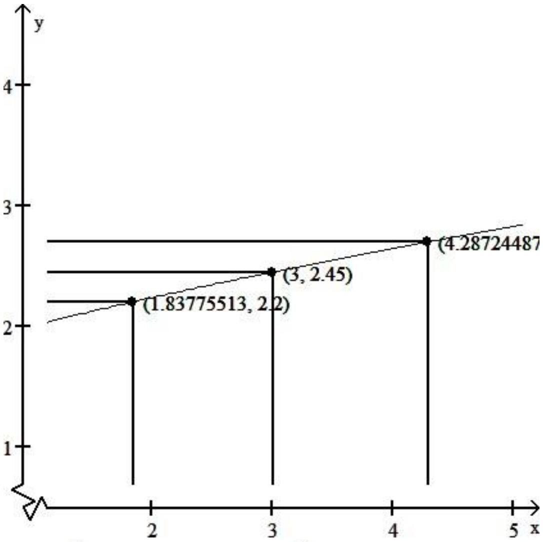
$x_0 = 3$

$L = 3$

$\varepsilon = \frac{1}{4}$

A) $\frac{1}{2}$　　B) $\frac{1}{4}$　　C) 0.4792　　D) 0

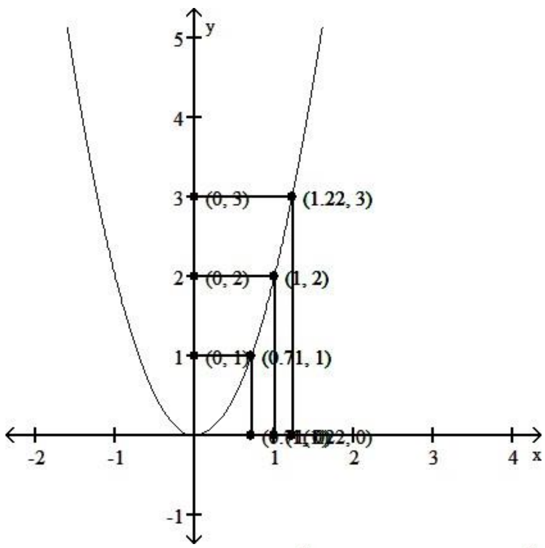
129) 129) _____



$f(x) = \sqrt{x + 3}$
$x_0 = 3$
$L = \sqrt{6}$
$\varepsilon = \frac{1}{4}$

A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) -0.55 D) 1.16

130) 130) _____

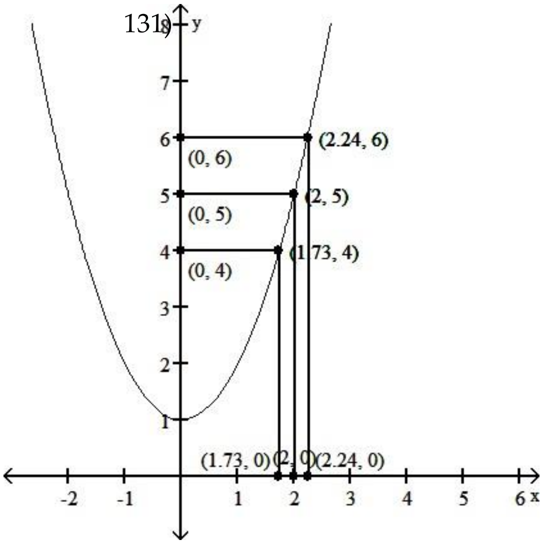


$f(x) = 2x^2$
$x_0 = 1$
$L = 2$
$\varepsilon = 1$

A) 0.22 B) $\frac{1}{2}$ C) $\frac{1}{6}$ D) 1

131)

131) ______



$f(x) = x^2 + 1$
$x_0 = 2$
$L = 5$
$\varepsilon = 1$

A) 3 B) 0.24 C) $\frac{1}{6}$ D) $\frac{1}{2}$

Solve the problem.

132) Given $f(x) = 10x + 9$, $L = 39$, $x_0 = 3$, and $\varepsilon = .01$, find the greatest value for $\delta > 0$ such that $0 < |x - x_0| < \delta$ the inequality $|f(x_0) - L| < \varepsilon$ holds. 132) ______

A) 0.0033 B) 0.005 C) 0.002 D) 0.001

133) Given $f(x) = 8x - 3$, $L = 13$, $x_0 = 2$, and $\varepsilon = .01$, find the greatest value for $\delta > 0$ such that $0 < |x - x_0| < \delta$ the inequality $|f(x_0) - L| < \varepsilon$ holds. 133) ______

A) 0.0025 B) 0.0012 C) 0.0006 D) 0.005

134) Given $f(x) = -2x + 3$, $L = -1$, $x_0 = 2$, and $\varepsilon = .01$, find the greatest value for $\delta > 0$ such that $0 < |x - x_0| < \delta$ the inequality $|f(x_0) - L| < \varepsilon$ holds. 134) ______

A) 0.02 B) 0.01 C) 0.005 D) -0.005

135) Given $f(x) = -7x - 4$, $L = -25$, $x_0 = 3$, and $\varepsilon = .01$, find the greatest value for $\delta > 0$ such that $0 < |x - x_0| < \delta$ the inequality $|f(x_0) - L| < \varepsilon$ hold 135)
s.

A) -0.0033 B) 0.0029 C) 0.0008 D) 0.0015

136) Given f(x) = $\sqrt{x + 2}$, L = $\sqrt{4}$, x_0 = 2, and ε = 1, find the greatest value for $\delta > 0$ such that $0 < |x - x_0| < \delta$ the inequality $|f(x_0) - L| < \varepsilon$ holds. 136) _____

A) 3 B) 9 C) 5 D) 1

137) Given f(x) = $\sqrt{8 - x}$, L = $\sqrt{4}$, x_0 = 4, and ε = 1, find the greatest value for $\delta > 0$ such that $0 < |x - x_0| < \delta$ the inequality $|f(x_0) - L| < \varepsilon$ holds. 137) _____

A) 3 B) -5 C) 7 D) 4

138) Given f(x) = $2x^2$, L =18, x_0 = 3, and ε = 0.2, find the greatest value for $\delta > 0$ such that $0 < |x - x_0| < \delta$ ⇒ the inequality $|f(x_0 - L| < \varepsilon$ holds. 138) _____

A) 2.9833 B) 0.0166 C) 3.0166 D) 0.0167

139) Given f(x) = 1/x, L = 1/ 3, x_0 = 3, and ε = 0.5, find the greatest value for $\delta > 0$ such that $0 < |x - x_0| < \delta$ ⇒ the inequality $|f(x_0 - L| < \varepsilon$ holds. 139) _____

A) 1.8 B) -9 C) -18 D) 0.6

140) You are asked to make some circular cylinders, each with a cross-sectional area of $9\ \text{cm}^2$. To do this, you need to know how much deviation from the ideal cylinder diameter of $x_0 = 2.62$ cm you can allow and still have the area come within $0.1\ \text{cm}^2$ of the required $9\ \text{cm}^2$. To find out, let $A = \pi\left(\frac{x}{2}\right)^2$ and look for the interval in which you must hold x to make $|A - 9| < 0.1$. What interval do you find? 140) _____

A) $(5.9666, 6.0332)$ B) $(3.3663, 3.4039)$
C) $(2.3803, 2.4069)$ D) $(0.5642, 0.5642)$

141) Ohm's Law for electrical circuits is stated V = RI, where V is a constant voltage, R is the resistance in ohms and I is the current in amperes. Your firm has been asked to supply the resistors for a circuit in which V will be 11 volts and I is to be 6 ± 0.1 amperes. In what interval does R have to lie for I to be within 0.1 amps of the target value $I_0 = 6$? 141) _____

A) $\left(\frac{110}{61}, \frac{110}{59}\right)$ B) $\left(\frac{61}{110}, \frac{59}{110}\right)$
C) $\left(\frac{110}{59}, \frac{110}{61}\right)$ D) $\left(\frac{10}{59}, \frac{10}{61}\right)$

142) The cross-sectional area of a cylinder is given by A = $\pi D^2/4$, where D is the cylinder diameter. Find the tolerance range of D such that $|A - 10|$ < 0.01 as long as D_{min} < D < D_{max}. 142) _____

A) D_{min} = 3.558, D_{max} = 3.570 B) D_{min} = 3.567, D_{max} = 3.570
C) D_{min} = 3.567, D_{max} = 3.578 D) D_{min} = 3.558, D_{max} = 3.578

143) The current in a simple electrical circuit is given by I = V/R, where I is the curren

t in amperes, V is the voltage in volts, and R is the resistance in ohms. When V = 12 volts, what is a 12Ω resistor's tolerance for the current to be within 1 ± 0.01 amp?

143) ____

A) 10% B) 0.1% C) 1% D) 0.01%

144) Select the correct statement for the definition of the limit: $\lim_{x \to x_0} f(x) = L$ means that ________________ 144) ____

A) if given a number ε > 0, there exists a number δ > 0, such that for all x,
$0 < |x - x_0| < \delta$ implies $|f(x) - L| > \varepsilon$.

B) if given any number ε > 0, there exists a number δ > 0, such that for all x,
$0 < |x - x_0| < \varepsilon$ implies $|f(x) - L| > \delta$.

C) if given any number ε > 0, there exists a number δ > 0, such that for all x,
$0 < |x - x_0| < \varepsilon$ implies $|f(x) - L| < \delta$.

D) if given any number ε > 0, there exists a number δ > 0, such that for all x,
$0 < |x - x_0| < \delta$ implies $|f(x) - L| < \varepsilon$.

145) Identify the incorrect statements about limits. 145) ____

I. The number L is the limit of f(x) as x approaches x_0 if f(x) gets closer to L as x approaches x_0.

II. The number L is the limit of f(x) as x approaches x_0 if, for any ε > 0, there corresponds a δ > 0 such that $|f(x) - L| < \varepsilon$ whenever $0 < |x - x_0| < \delta$.

III. The number L is the limit of f(x) as x approaches x_0 if, given any ε > 0, there exists a value of x for which $|f(x) - L| < \varepsilon$.

A) I and II B) II and III

C) I and III

D) I, II, and III

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

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

104) B
105) B
106) C
107) C
108) D
109) B
110) B
111) C
112) A
113) D
114) B
115) B
116) C
117) A
118) D
119) C
120) D
121) B
122) A
123) D
124) C
125) C
126) A
127) C
128) C
129) D
130) A
131) B
132) D
133) B
134) C
135) D
136) A
137) A
138) B
139) A
140) B
141) A
142) B
143) C
144) D
145) C