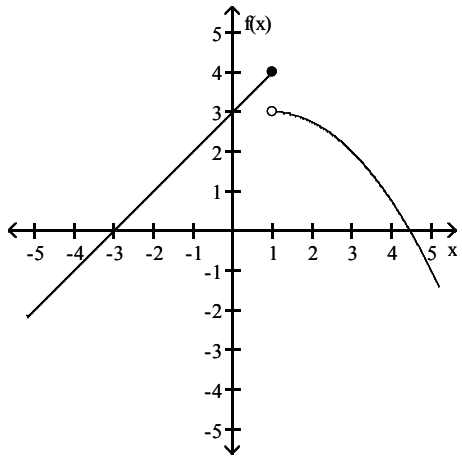
MAC 2233
Chapter 3 (Lial)
Practice for Exam

Name_____
Date: _____

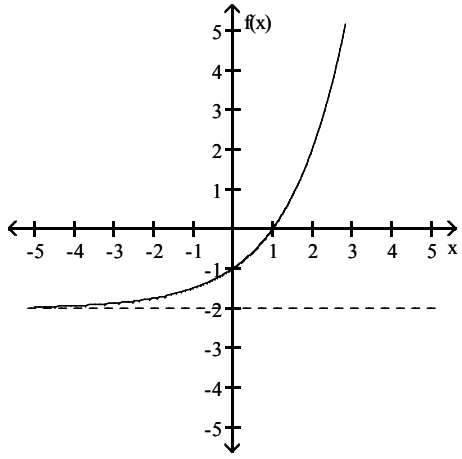
SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Decide whether the limit exists. If it exists, find its value.

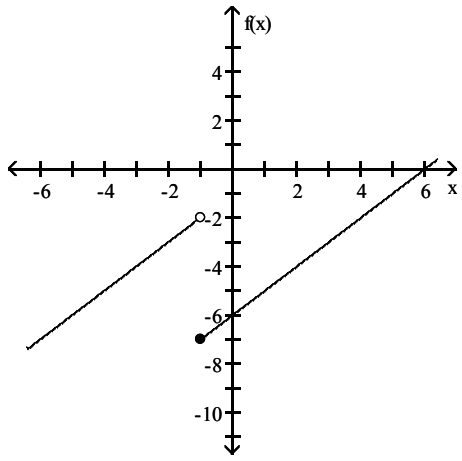
1) $\lim_{x \to 1^+} f(x)$ 1) _____



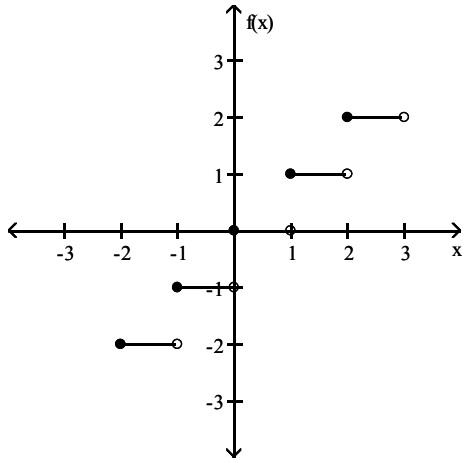
2) $\lim_{x \to \infty} f(x)$ 2) _____



3) $\lim_{x \to (-1)^-} f(x)$ and $\lim_{x \to (-1)^+} f(x)$ 3) _____



4) $\lim_{x \to -1} f(x)$ 4) _____



Complete the table and use the result to find the indicated limit.

5) If $f(x) = x^2 + 8x - 2$, find $\lim_{x \to 2} f(x)$. 5) _____

x	1.9	1.99	1.999	2.001	2.01	2.1
f(x)						

6) If $f(x) = \dfrac{x - 4}{\sqrt{x} - 2}$, find $\lim_{x \to 4} f(x)$. 6) _____

x	3.9	3.99	3.999	4.001	4.01	4.1
f(x)						

Give an appropriate answer.

7) Let $\lim_{x \to 10} f(x) = 4$ and $\lim_{x \to 10} g(x) = -6$. Find $\lim_{x \to 10} [f(x) \cdot g(x)]$. 7) _____

8) Let $\lim_{x \to 2} f(x) = 3$ and $\lim_{x \to 2} g(x) = -8$. Find $\lim_{x \to 2} [f(x) + g(x)]^2$. 8) _____

9) Let $\lim_{x \to 10} f(x) = 4$. Find $\lim_{x \to 10} \log_2 f(x)$. 9) _____

10) Let $\lim_{x \to -7} f(x) = 4$ and $\lim_{x \to -7} g(x) = -6$. Find $\lim_{x \to -7} \left[\frac{-2f(x) - 3g(x)}{-8 + g(x)}\right]$. 10) _____

Use the properties of limits to help decide whether the limit exists. If the limit exists, find its value.

11) $\lim_{x \to 3} \frac{x^2 + 4x - 21}{x - 3}$ 11) _____

12) $\lim_{x \to 4} \frac{x^2 - 16}{x^2 - 7x + 12}$ 12) _____

13) $\lim_{x \to 4} \frac{\sqrt{x} - 2}{x - 4}$ 13) _____

14) $\lim_{x \to 0} \frac{\frac{1}{x + 7} - \frac{1}{7}}{x}$ 14) _____

15) $\lim_{x \to \infty} \frac{-5x^2 + 7x - 4}{3x^2 + 6}$ 15) _____

16) $\lim_{x \to -\infty} \frac{x}{4x - 13}$ 16) _____

17) $\lim_{x \to \infty} \frac{4x^7 - x + 4}{4x^2 - x - 4}$ 17) _____

Use the properties of limits to help decide whether each limit exits. If a limit exists, find its value.

18) Let $f(x) = \begin{cases} x^2 - 5 & \text{if } x < 0 \\ 2 & \text{if } x \geq 0 \end{cases}$. Find $\lim_{x \to -2} f(x)$. 18) _____

19) Let $f(x) = \begin{cases} -3x + 9 & \text{if } x < 1 \\ 1 & \text{if } x = 1 \\ 3x - 10 & \text{if } x > 1 \end{cases}$. Find $\lim_{x \to 1} f(x)$. 19) _____

Solve the problem.

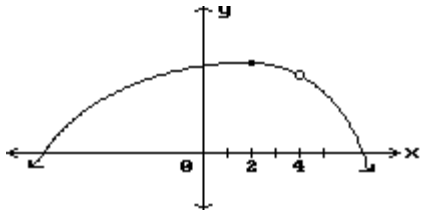
20) A company training program determines that, on average, a new employee can do P(s) pieces of work per day after s days of on–the–job training, where $P(s) = \frac{96 + 55s}{s + 6}$. Find $\lim_{s \to 3} P(s)$. 20) _____

21) Suppose that the cost, p, of shipping a 3–pound parcel depends on the distance shipped, x, according to the function p(x) depicted in the graph. Find each limit, if it exists: 21) _____

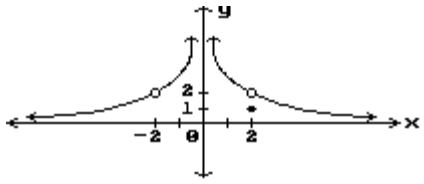
$\lim_{x \to 100} p(x)$, $\lim_{x \to 500} p(x)$, $\lim_{x \to 1500} p(x)$

Find all points where the function is discontinuous.

22) 22) _____



23) 23) _____



Find all values x = a where the function is discontinuous.

24) $f(x) = \frac{-2x}{(7x - 7)(2 - 8x)}$ 24) _____

25) $f(x) = \frac{x^2 - 49}{x + 7}$ 25) _____

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

26) $y = x^2 + 2x$ between $x = 2$ and $x = 6$ 26) _____

27) $y = \sqrt{2x}$ between $x = 2$ and $x = 8$ 27) _____

28) $y = \frac{3}{x + 2}$ between $x = 1$ and $x = 4$ 28) _____

Suppose the position of an object moving in a straight line is given by the specified function. Find the instantaneous velocity at time t.

29) $s(t) = t^2 + 3t + 1$, $t = 5$ 29) _____

30) $s(t) = t^3 + 4t + 6$, $t = 1$ 30) _____

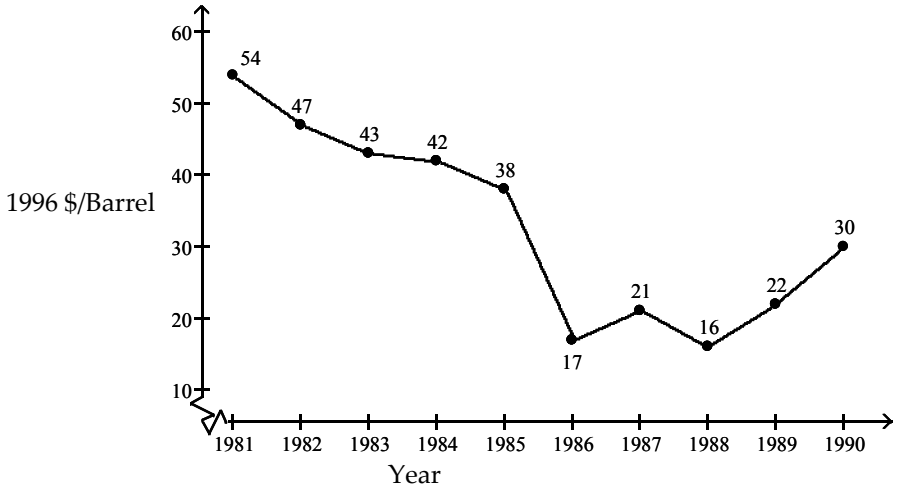
Find the instantaneous rate of change for the function at the given value.

31) $F(x) = x^2 + 8x$ at $x = 5$ 31) _____

32) $g(t) = 5t^2 + t$ at $t = -4$ 32) _____

Solve the problem.

33) The graph shows the average cost of a barrel of crude oil for the years 1981 to 1990 in constant 1996 dollars. Find the approximate average change in price from 1981 to 1986. 33) _____



34) Suppose that the revenue from selling x radios is $R(x) = 75x - \frac{x^2}{10}$ dollars. Use the function $R'(x)$ to estimate the increase in revenue that will result from increasing production from 120 radios to 121 radios per week. 34) _____

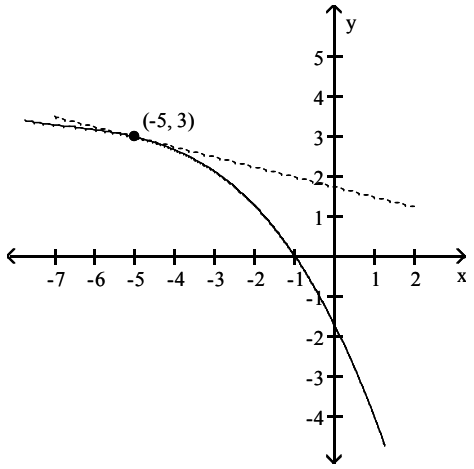
35) Suppose that the dollar cost of producing x radios is $c(x) = 400 + 20x - 0.2x^2$. Find the average cost per radio of producing the first 30 radios. 35) _____

36) A particular strain of influenza is known to spread according to the function $p(t) = \frac{1}{2}(t^2 + t)$, where t is the number of days after the first appearance of the strain and p(t) is the percentage of the population that is infected. Find the instantaneous rate of change of p with respect to t at t = 3. 36) _____

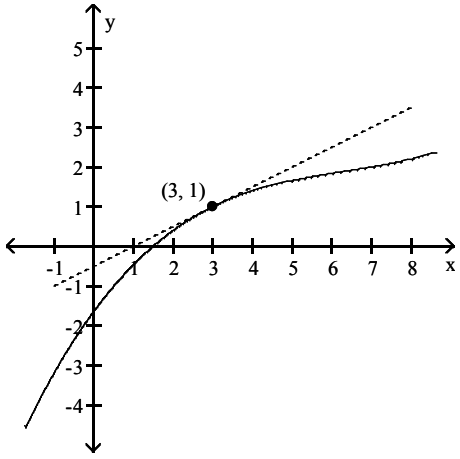
37) A ball is thrown vertically upward from the ground at a velocity of 75 feet per second. Its distance from the ground after t seconds is given by $s(t) = -16t^2 + 75t$. How fast is the ball moving 3 seconds after being thrown? 37) _____

Estimate the slope of the tangent line to the curve at the given point.

38) 38) _____



39) 39) _____



Find f'(x) at the given value of x.

40) $f(x) = \frac{-11}{x}$; Find f′(−8). 40) _____

41) $f(x) = \sqrt{x + 6}$; Find f′(10). 41) _____

42) $f(x) = \frac{32}{x}$; Find $f'(2)$. 42) _____

43) $f(x) = -6x^2 + 4x + 5$; Find $f'(7)$. 43) _____

Find the equation of the secant line through the points where x has the given values.

44) $f(x) = x^2 + 2x$; $x = 4, x = 6$ 44) _____

45) $f(x) = 3\sqrt{x}$; $x = 9, x = 25$ 45) _____

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

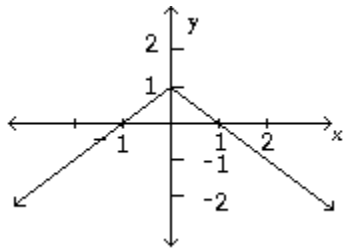
46) $f(x) = \frac{5}{x+1}$; $x = 4$ 46) _____

47) $f(x) = -4 - x^2$; $x = 4$ 47) _____

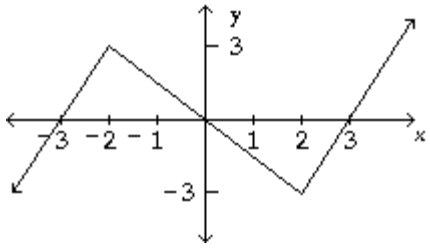
48) $f(x) = x^2 - 3$; $x = -4$ 48) _____

Find the x–values where the function does not have a derivative.

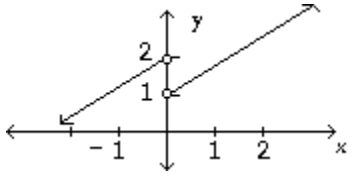
49) 49) _____

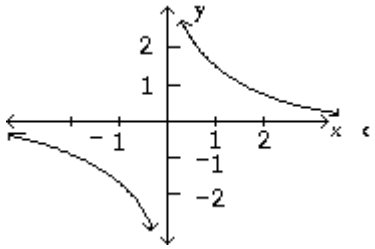


50) 50) _____



51) 51) _____



52) 

52) _____

Solve the problem.

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

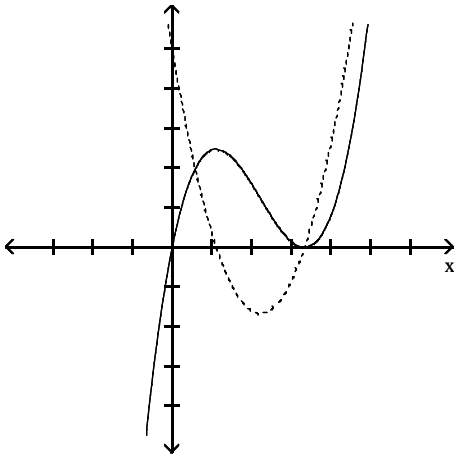
53) _____

54) The profit from the expenditure of x thousand dollars on advertising is given by $P(x) = 950 + 25x - 3x^2$. Find the marginal profit when the expenditure is $x = 9$.

54) _____

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

The graphs of a function f(x) and its derivative f'(x) are shown below. Decide which is the graph of f(x) and which is the graph of f'(x).

55) 

55) _____

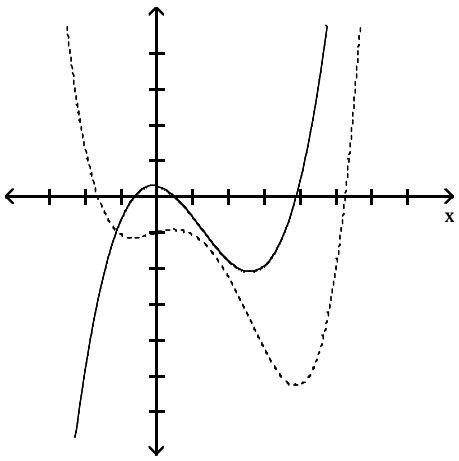
A) Neither graph could be the derivative of the other.

B) f(x) is the solid line; f'(x) is the dashed line.

C) f(x) is the dashed line; f'(x) is the solid line.

D) Either graph could be the derivative of the other.

56) 56) _____



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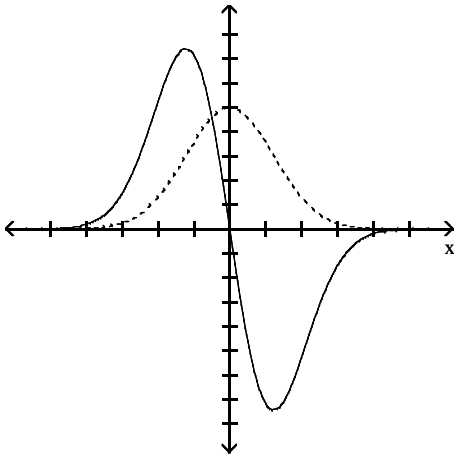
B) f(x) is the dashed line; f'(x) is the solid line.

C) Neither graph could be the derivative of the other.

D) Either graph could be the derivative of the other.

57) 57) _____



A) Neither graph could be the derivative of the other.

B) f(x) is the solid line; f'(x) is the dashed line.

C) Either graph could be the derivative of the other.

D) f(x) is the dashed line; f'(x) is the solid line.

1) 3
2) ∞
3) –2, –7
4) Does not exist
5)

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

6)

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

7) –24
8) 25
9) 2
10) $-\frac{5}{7}$
11) 10
12) 8
13) $\frac{1}{4}$
14) $-\frac{1}{49}$
15) $-\frac{5}{3}$
16) $\frac{1}{4}$
17) ∞
18) –1
19) Does not exist
20) 29
21) 5; does not exist; 15
22) x = 4
23) x = –2, x = 0, x = 2
24) a = 1, $\frac{1}{4}$
25) a = –7
26) 10
27) $\frac{1}{3}$
28) $-\frac{1}{6}$
29) 13
30) 7
31) 18
32) –39
33) About –$7/year
34) $51.00
35) $27.33

36) $\frac{7}{2}$% per day

37) –21 ft per sec

38) $-\frac{1}{4}$

39) $\frac{1}{2}$

40) $\frac{11}{64}$

41) $\frac{1}{8}$

42) – 8

43) –80

44) y = 12x – 24

45) $y = \frac{3}{8}x + \frac{45}{8}$

46) $y = -\frac{1}{5}x + \frac{9}{5}$

47) y = –8x + 12

48) y = –8x – 19

49) x = 0

50) x = –2, x = 2

51) x = 0

52) x = 0

53) D'(p) = –6p + 6

54) –29 thousand dollars

55) B

56) B

57) D