

Name _____

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

1) $\int (4x^{11} - 7x^3 + 8) dx$ 1) _____

A) $\frac{1}{4}x^{12} - \frac{7}{3}x^4 + 8x + C$

B) $12x^{12} - \frac{7}{3}x^4 + 8x + C$

C) $\frac{1}{3}x^{12} - \frac{7}{4}x^4 + 8x + C$

D) $12x^{12} - \frac{7}{4}x^4 + 8x + C$

2) $\int \frac{39}{x^2} dx$ 2) _____

A) $39x + C$

B) $\frac{39}{x} + C$

C) $-\frac{39}{x} + C$

D) $-39x + C$

Find f such that the given conditions are satisfied.

3) $f'(x) = x - 2$, $f(1) = 11$ 3) _____

A) $f(x) = x^2 - 2x$

B) $f(x) = \frac{x^2}{2} - 2x + \frac{27}{2}$

C) $f(x) = x^2 - 2x + 12$

D) $f(x) = \frac{x^2}{2} - 2x + \frac{25}{2}$

4) $f'(x) = 5x^2 - 7x + 4$, $f(0) = 2$ 4) _____

A) $f(x) = \frac{5}{3}x^3 - \frac{7}{2}x^2 + 4x - 4$

B) $f(x) = \frac{5}{3}x^3 - \frac{7}{2}x^2 + 4x + 2$

C) $f(x) = \frac{5}{3}x^3 - \frac{7}{2}x^2 + 4x - 2$

D) $f(x) = \frac{5}{3}x^3 + \frac{7}{2}x^2 + 4x + 2$

Solve the problem.

5) Find a company's total-cost function if its marginal cost function is $C'(x) = 10x - 4$ and its fixed cost is \$2. 5) _____

A) $C(x) = 5x^2 - 4x + 1$

B) $C(x) = 10x^2 - 4x + 1$

C) $C(x) = 5x^2 - 4x + 2$

D) $C(x) = 10x^2 - 4x + 2$

6) A company finds that its marginal revenue from the sale of the xth unit of its product is given by 6) _____

$R'(x) = 4x^2 - 4$. Assuming that $R(0) = 0$, find the total-revenue function R.

A) $R(x) = 8x$

B) $R(x) = 2x^3 - 4x^2$

C) $R(x) = \frac{4}{3}x^3 - 2x$

D) $R(x) = \frac{4}{3}x^3 - 4x$

Evaluate the indefinite integral.

7) $\int (3 + t)\sqrt{t} dt$

7) _____

A) $3t^{3/2} + t^{5/2} + C$

B) $\frac{9}{2}t^{3/2} + \frac{5}{2}t^{5/2} + C$

C) $2t^{3/2} + \frac{1}{2}t^2 + C$

D) $2t^{3/2} + \frac{2}{5}t^{5/2} + C$

8) $\int \frac{x^3 - 4x + 9}{x^2} dx$

8) _____

A) $\frac{x^2}{2} + \frac{4}{x^2} - \frac{18}{x^3} + C$

B) $\frac{x^2}{2} - 4 \ln|x| - \frac{9}{x} + C$

C) $x^2 - 4 \ln|x| + \frac{9}{x} + C$

D) $\frac{x^2}{2} - 2x^2 - \frac{9}{x} + C$

9) $\int (x - 4)(4x + 4) dx$

9) _____

A) $\frac{4}{3}x^3 - 8x^2 - 16x + C$

B) $4x^3 - 12x^2 - 16x + C$

C) $\frac{4}{3}x^3 - 6x^2 - 16x + C$

D) $8x - 12 + C$

Solve the problem.

10) Hatts and Company determines that its marginal cost, in dollars per hat, is given by

10) _____

$$C'(x) = -\frac{1}{40}x + 40, \text{ for } x \leq 350.$$

Find the total cost of producing the first 260 hats.

A) \$9555.00

B) \$33.50

C) \$36.75

D) \$19,110.00

11) Rejoyne Inc. has a marginal-profit function given by

11) _____

$$P'(x) = -2x + 140, \text{ where } P'(x) \text{ is in dollars per unit.}$$

This means that the rate of change of total profit with respect to the number of units produced, x , is $P'(x)$. Find the total profit from the production and sale of the first 40 units.

A) \$60

B) \$100

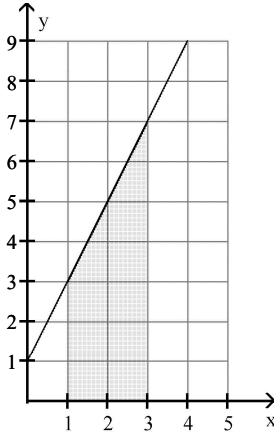
C) \$4000

D) \$8000

Find the area under the given curve over the indicated interval.

12) $y = 2x + 1$; $[1, 3]$

12) _____



A) 10

B) 5

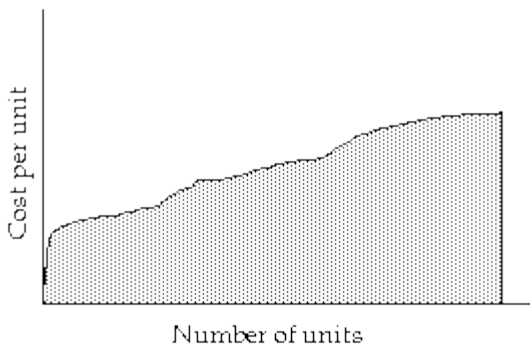
C) 12.5

D) 7.5

State what the shaded area represents.

13)

13) _____



A) Rate of change of cost

B) Cost per unit

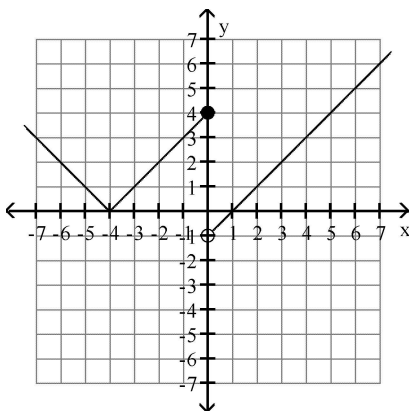
C) Total cost

D) Total number of units

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

14) Find $\lim_{x \rightarrow 0^-} f(x)$ and $\lim_{x \rightarrow 0^+} f(x)$.

14) _____



A) 4; -1

B) 4; 1

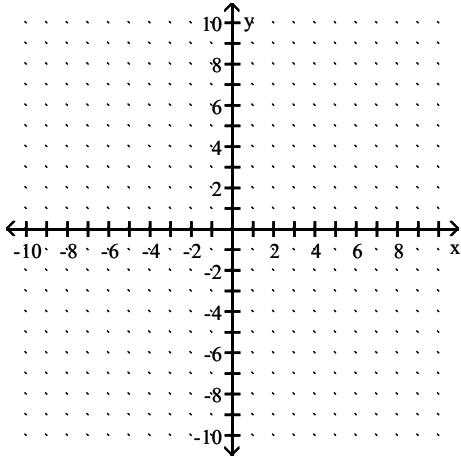
C) -1; 4

D) -4; -1

Graph the function and then find the specified limit. When necessary, state that the limit does not exist.

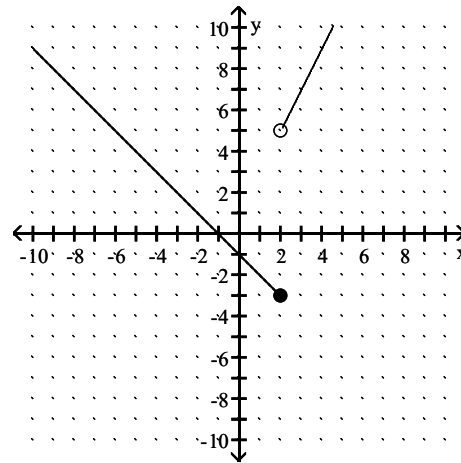
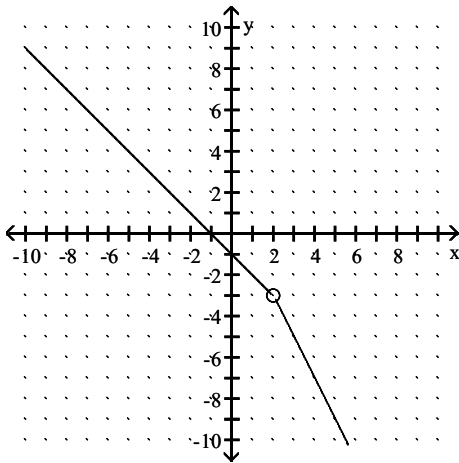
$$15) f(x) = \begin{cases} -1 - x, & \text{for } x \leq 2, \\ 1 - 2x, & \text{for } x > 2. \end{cases}; \lim_{x \rightarrow 2^+} f(x)$$

15) _____



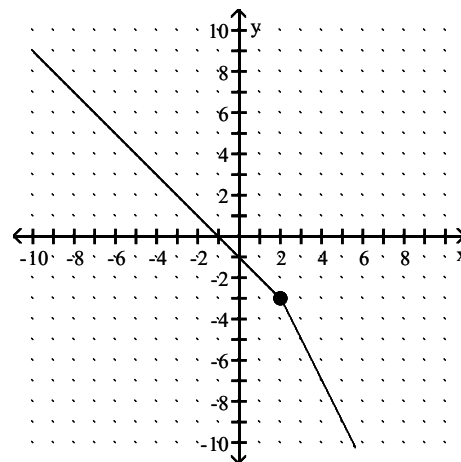
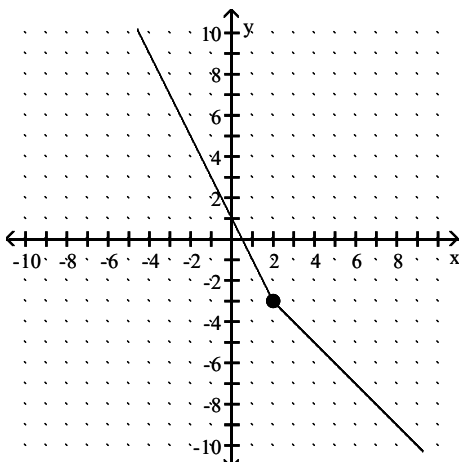
A) $\lim_{x \rightarrow 2^+} f(x) = -3$

B) $\lim_{x \rightarrow 2^+} f(x) = 5$



C) $\lim_{x \rightarrow 2^+} f(x) = -3$

D) $\lim_{x \rightarrow 2^+} f(x) = -3$



Find the limit, if it exists.

16) $\lim_{x \rightarrow 2} (x^2 + 8x - 2)$

16) _____

A) -18

B) 0

C) Does not exist

D) 18

In the exercise below, the initial substitution of $x = a$ yields the form $0/0$. Look for ways to simplify the function algebraically, or use a table and/or graph to determine the limit. When necessary, state that the limit does not exist.

17) $\lim_{x \rightarrow 36} \frac{\sqrt{x} - 6}{x - 36}$

17) _____

A) $\frac{1}{6}$

B) 6

C) 0

D) $\frac{1}{12}$

Find a simplified difference quotient for the function.

18) $f(x) = 10x^2$

18) _____

A) $20x$

B) $20x + h$

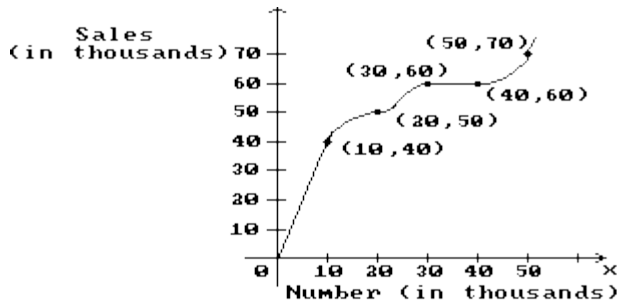
C) $20x + 10h$

D) $2x + h$

Solve the problem.

- 19) The graph shows the total sales in thousands of dollars from the distribution of x thousand catalogs. Find the average rate of change of sales with respect to the number of catalogs distributed for the change in x .

19) _____



10 to 20

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

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

C) 2

D) 1

Find an equation for the line tangent to the graph of the given function at the indicated point.

20) $f(x) = x^2 - x$ at $(4, 12)$

20) _____

A) $y = 7x + 20$

B) $y = 7x - 20$

C) $y = 7x - 16$

D) $y = 7x + 16$

Differentiate.

21) $f(x) = (4x - 2)(5x^3 - x^2 + 1)$

21) _____

A) $f'(x) = 60x^3 + 42x^2 - 14x + 4$

B) $f'(x) = 20x^3 + 14x^2 - 42x + 4$

C) $f'(x) = 80x^3 - 42x^2 + 4x + 4$

D) $f'(x) = 80x^3 - 14x^2 + 42x + 4$

22) $y = \frac{x}{2x - 8}$

22) _____

A) $\frac{dy}{dx} = -\frac{8x}{(2x - 8)^2}$

B) $\frac{dy}{dx} = \frac{4x - 8}{(2x - 8)^2}$

C) $\frac{dy}{dx} = -\frac{8}{2x - 8}$

D) $\frac{dy}{dx} = -\frac{8}{(2x - 8)^2}$

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

23) _____

A) $f'(x) = 5(2x^2 + 4)^4$

B) $f'(x) = 20x(2x^2 + 4)^4$

C) $f'(x) = 20(2x^2 + 4)^4$

D) $f'(x) = (20x + 4)(2x^2 + 4)^4$

24) $f(x) = \sqrt{1 - 10x}$

24) _____

A) $f'(x) = -\frac{5x}{\sqrt{1 - 10x}}$

B) $f'(x) = -\frac{5}{\sqrt{1 - 10x}}$

C) $f'(x) = -\frac{10}{\sqrt{1 - 10x}}$

D) $f'(x) = \frac{1}{2\sqrt{1 - 10x}}$

Find $\frac{d^2y}{dx^2}$.

25) $y = 4x^4 - 5x^2 + 8$

25) _____

A) $16x^2 - 10x$

B) $48x^2 - 10x$

C) $48x^2 - 10$

D) $16x^2 - 10$

Find the indicated derivative of the function.

26) $\frac{d^3y}{dx^3}$ of $y = 3x^3 + 5x^2 - 6x$

26) _____

A) 18

B) $18x + 9$

C) $9x + 18$

D) 9

Find the relative extrema of the function, if they exist.

27) $f(x) = -4x^2 - 2x - 8$

27) _____

A) Relative maximum at $\left(-\frac{1}{4}, -\frac{31}{4}\right)$

B) Relative maximum at $\left(\frac{1}{4}, \frac{31}{4}\right)$

C) Relative maximum at $\left(-4, -\frac{31}{4}\right)$

D) Relative minimum at $\left(\frac{1}{4}, \frac{31}{4}\right)$

Find the relative extrema of the function and classify each as a maximum or minimum.

28) $f(x) = -9x^2 - 2x - 11$

28) _____

A) Relative maximum: $\left(-\frac{1}{9}, -\frac{98}{9}\right)$

B) Relative maximum: $\left(\frac{1}{9}, \frac{98}{9}\right)$

C) Relative minimum: $\left(\frac{1}{9}, \frac{98}{9}\right)$

D) Relative maximum: $\left(-9, -\frac{98}{9}\right)$

Find the points of inflection.

29) $f(x) = 8x^3 + 2x + 4$

29) _____

A) (0, 2)

B) (0, 4)

C) (2, 0)

D) (4, 0)

Determine where the given function is increasing and where it is decreasing.

- 30) $s(x) = -x^2 - 24x - 135$ 30) _____
A) Decreasing on $(-\infty, -12)$ and $(0, \infty)$, increasing on $(-12, 0)$
B) Decreasing on $(-\infty, -12)$, increasing on $(-12, \infty)$
C) Increasing on $(-\infty, -12)$, decreasing on $(-12, \infty)$
D) Increasing on $(-\infty, \infty)$

Determine where the given function is concave up and where it is concave down.

- 31) $f(x) = x^3 + 3x^2 - x - 24$ 31) _____
A) Concave up on $(-\infty, -1)$, concave down on $(-1, \infty)$
B) Concave down on $(-\infty, -1)$ and $(1, \infty)$, concave up on $(-1, 1)$
C) Concave down for all x
D) Concave up on $(-1, \infty)$, concave down on $(-\infty, -1)$

Determine the vertical asymptote(s) of the given function. If none exists, state that fact.

- 32) $h(x) = \frac{3x}{x-6}$ 32) _____
A) $x = 3$ B) $x = 6$ C) $x = -6$ D) none

Determine the horizontal asymptote of the given function. If none exists, state that fact.

- 33) $h(x) = \frac{8x^2 - 5x - 3}{2x^2 - 6x + 2}$ 33) _____
A) $y = 0$ B) $y = 4$
C) $y = \frac{5}{6}$ D) no horizontal asymptotes

Solve the problem.

- 34) $P(x) = -x^3 + \frac{27}{2}x^2 - 60x + 100$, $x \geq 5$ is an approximation to the total profit (in thousands of dollars) 34) _____
from the sale of x hundred thousand tires. Find the number of tires that must be sold to maximize profit.
A) 550,000 B) 500,000 C) 500,000 D) 450,000

- 35) Find the number of units that must be produced and sold in order to yield the maximum profit, 35) _____
given the following equations for revenue and cost:
 $R(x) = 50x - 0.5x^2$
 $C(x) = 3x + 10$.
A) 53 units B) 57 units C) 47 units D) 48 units

Solve the system.

- 36) $x + y + z = 0$ 36) _____
 $x - y + 5z = -24$
 $3x + y + z = 6$
A) $(3, 2, -5)$ B) $(-5, 2, 3)$ C) $(-5, 3, 2)$ D) No solution

Perform the matrix operation.

37) Given $A = \begin{bmatrix} 3 & 3 \\ 2 & 6 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 4 \\ -1 & 6 \end{bmatrix}$, find $2A + B$.

37) _____

A)

$$\begin{bmatrix} 6 & 10 \\ 3 & 18 \end{bmatrix}$$

B)

$$\begin{bmatrix} 6 & 10 \\ 1 & 12 \end{bmatrix}$$

C)

$$\begin{bmatrix} 6 & 14 \\ 2 & 24 \end{bmatrix}$$

D)

$$\begin{bmatrix} 6 & 7 \\ 3 & 12 \end{bmatrix}$$

Find the product, if possible.

38) Given $A = \begin{bmatrix} -2 & 3 \\ 3 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 0 \\ -1 & 2 \end{bmatrix}$, find AB .

38) _____

A)

$$\begin{bmatrix} 6 & 1 \\ 4 & -8 \end{bmatrix}$$

B)

$$\begin{bmatrix} 1 & 6 \\ -8 & 4 \end{bmatrix}$$

C)

$$\begin{bmatrix} 4 & -6 \\ -4 & 1 \end{bmatrix}$$

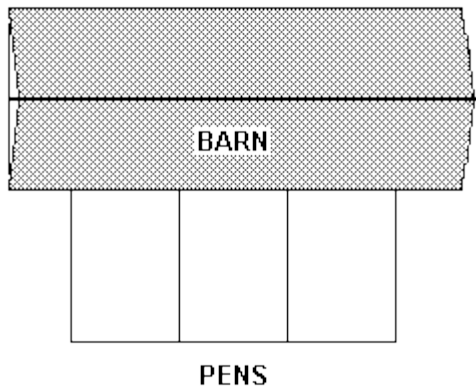
D)

$$\begin{bmatrix} 4 & 0 \\ -3 & 4 \end{bmatrix}$$

Solve the problem.

- 39) A farmer decides to make three identical pens with 160 feet of fence. The pens will be next to each other sharing a fence and will be up against a barn. The barn side needs no fence.

39) _____



What dimensions for the total enclosure (rectangle including all pens) will make the area as large as possible?

- A) 40 ft by 40 ft
 B) 20 ft by 80 ft
 C) 20 ft by 20 ft
 D) 26.67 ft by 133.33 ft
- 40) Find the number of units that must be produced and sold in order to yield the maximum profit, given the following equations for revenue and cost:

40) _____

$$R(x) = 30x - 0.5x^2$$

$$C(x) = 4x + 7.$$

- A) 34 units
 B) 33 units
 C) 27 units
 D) 26 units

- 41) The total cost, in dollars, to produce x DVD players is $C(x) = 120 + 3x - x^2 + 4x^3$. Find the marginal cost when $x = 3$.

41) _____

- A) \$105
 B) \$225
 C) \$228
 D) \$108

- 42) The profit, in dollars, from the sale of x compact disc players is $P(x) = x^3 - 4x^2 + 8x + 5$. Find the marginal profit when $x = 4$.

42) _____

- A) \$41
 B) \$36
 C) \$24
 D) \$29

Differentiate.

43) $f(x) = e^{8x}$ 43) _____
A) e^{8x} B) $\frac{1}{8}e^{8x}$ C) $8e^x$ D) $8e^{8x}$

44) $f(x) = -6e^{5x}$ 44) _____
A) $-30e^x$ B) $-30e^{5x}$ C) $-6e^{5x}$ D) $5e^{5x}$

Solve the problem.

45) A company's total cost, in millions of dollars, is given by $C(t) = 240 - 60e^{-t}$ where $t =$ time in years. 45) _____
Find the marginal cost when $t = 2$.
A) 32.48 million dollars per year B) 8.12 million dollars per year
C) 5.97 million dollars per year D) 16.24 million dollars per year

Find the indicated tangent line.

46) Find the tangent line to the graph of $f(x) = 2e^{4x}$ at the point $(0, 2)$. 46) _____
A) $y = 2x + 2$ B) $y = 8x + 2$ C) $y = -8x + 2$ D) $y = 4x + 2$

Solve.

47) Find the equation of the line tangent to the graph of $y = (x^2 - x) \ln(6x)$ at $x = 2$. 47) _____
A) $y = 8.455x - 11.94$ B) $y = 8.455x + 4.97$
C) $y = -11.94x + 8.455$ D) $y = -11.94x + 4.97$

Find the derivative of the function.

48) $y = \ln(x - 6)$ 48) _____
A) $\frac{1}{6 - x}$ B) $\frac{1}{x + 6}$ C) $-\frac{1}{x + 6}$ D) $\frac{1}{x - 6}$

49) $y = \ln 2x^2$ 49) _____
A) $\frac{2}{x}$ B) $\frac{2x}{x^2 + 2}$ C) $\frac{1}{2x + 2}$ D) $\frac{4}{x}$

50) $y = \frac{\ln x}{x^5}$ 50) _____
A) $\frac{5 \ln x - 1}{x^6}$ B) $\frac{1 - 5 \ln x}{x^6}$ C) $\frac{1 + 5 \ln x}{x^{10}}$ D) $\frac{1 - 5 \ln x}{x^{10}}$

51) $f(x) = \ln\left(\frac{x^4 - 1}{x}\right)$ 51) _____
A) $\frac{4x^3 - 1}{x(x^4 - 1)}$ B) $\frac{4x^3}{x^4 - 1}$ C) $\frac{3x^4 + 1}{x(x^4 - 1)}$ D) $\frac{x}{x^4 - 1}$

Answer Key

Testname:

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

Answer Key

Testname:

51) C