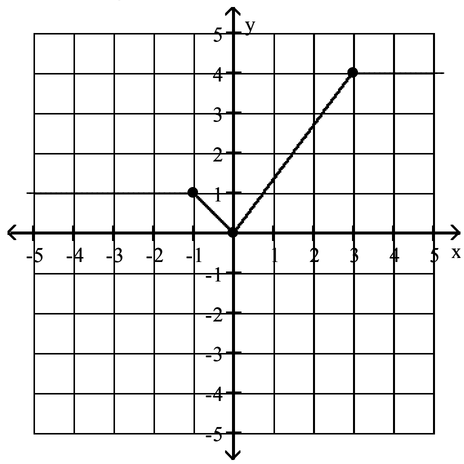
Math 1414
College Algebra
Final Examination Review

Name____________________________________

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

Identify the intervals where the function is changing as requested.

1) Increasing



A) $(-\infty, 0)$ B) $(0, 3)$ C) $(-1, 0)$ D) $(-\infty, -1)$

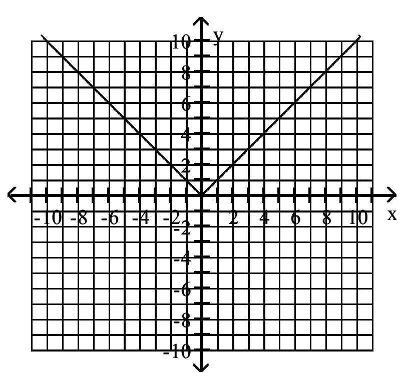
Find the slope of the line that goes through the given points.

2) $(\frac{1}{3}, 4)$ and $(\frac{1}{3}, -4)$

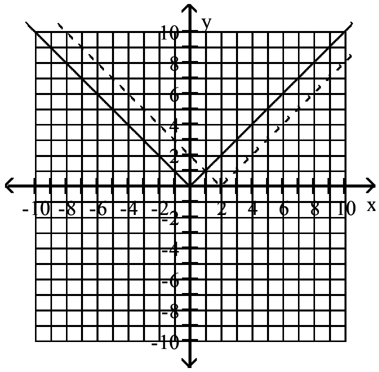
A) Undefined B) $-\frac{8}{7}$ C) $-\frac{7}{8}$ D) 0

Use the graph of the function f, plotted with a solid line, to sketch the graph of the given function g.

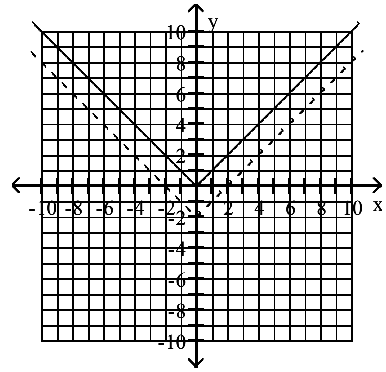
3) $g(x) = |x - 2|$



A)



B)



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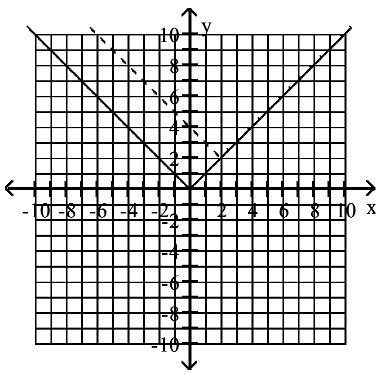
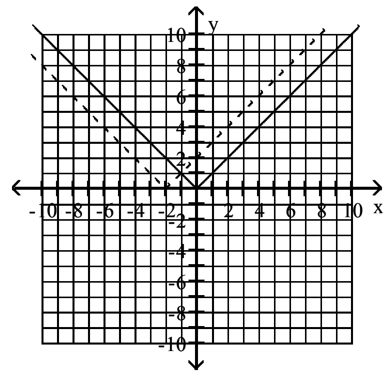


D)



Find the x-intercepts of the polynomial function. State whether the graph crosses the x-axis, or touches the x-axis and turns around, at each intercept.

4) $f(x) = -x^3(x + 4)^2(x - 9)$

A) 0, touches the x-axis and turns around;
4, crosses the x-axis;
9, crosses the x-axis

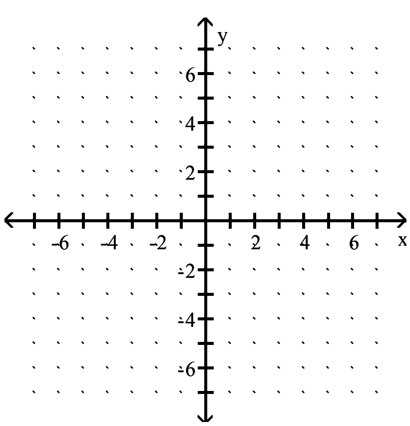
B) 0, crosses the x-axis;
-4, touches the x-axis and turns around;
9, crosses the x-axis

C) 0, touches the x-axis and turns around;
-4, touches the x-axis and turns around;
9, crosses the x-axis

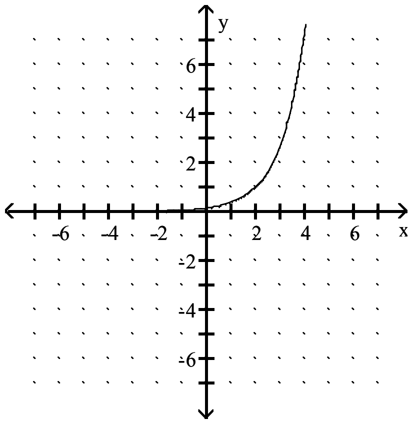
D) 0, crosses the x-axis;
4, touches the x-axis and turns around;
-9, crosses the x-axis

Graph the function.

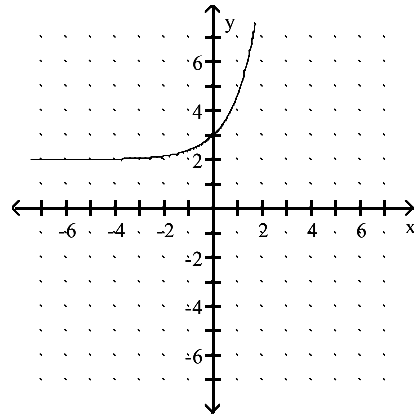
5) Use the graph of $f(x) = e^x$ to obtain the graph of $g(x) = e^x + 2$.



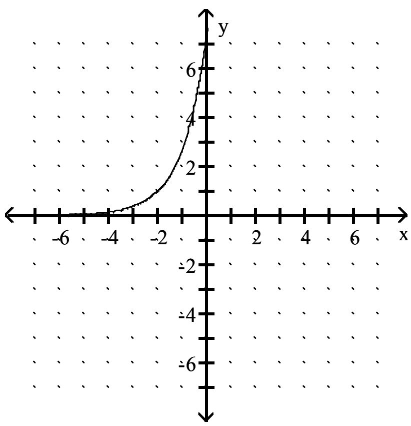
A)



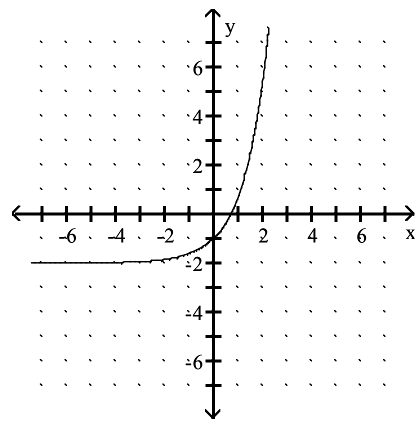
B)



C)



D)



Write the system of linear equations represented by the augmented matrix. Use x, y, z, and, if necessary, w for the variables. Then use back-substitution to find the solution.

6)
$$\left[\begin{array}{ccc|c} 1 & 3 & 2 & -8 \\ 0 & 1 & 9 & 6 \\ 0 & 0 & 1 & -9 \end{array}\right]$$

A) {(-251, 87, -9)} B) {(-251, -75, -9)} C) {(-14, -4, -10)} D) {(-8, 6, -9)}

Evaluate the factorial expression.

7) $\frac{7!}{5!}$

A) 2! B) 42 C) 7 D) $\frac{7}{5}$

Write the first four terms of the sequence whose general term is given.

8) $a_n = \left(-\frac{1}{3}\right)^n$

A) $\frac{1}{3}, -\frac{1}{6}, \frac{1}{9}, -\frac{1}{12}$

B) $-\frac{1}{3}, -\frac{1}{9}, -\frac{1}{27}, -\frac{1}{81}$

C) $-\frac{1}{3}, \frac{1}{9}, -\frac{1}{27}, \frac{1}{81}$

D) $-\frac{1}{3}, \frac{1}{6}, -\frac{1}{9}, -\frac{1}{12}$

9) $a_n = \frac{2(n+1)!}{n!}$

A) 3, 4, 5, 6
B) $4, 3, \frac{4}{3}, \frac{5}{12}$
C) $4, 3, \frac{8}{3}, \frac{5}{2}$
D) 4, 6, 8, 10

10) $a_n = \frac{n^3}{(n+1)!}$

A) $\frac{1}{2}, \frac{4}{3}, \frac{9}{8}, \frac{8}{15}$
B) $\frac{3}{2}, 1, \frac{3}{4}, \frac{3}{5}$
C) $\frac{1}{2}, \frac{4}{3}, \frac{9}{4}, \frac{16}{5}$
D) $\frac{3}{2}, 1, \frac{3}{8}, \frac{1}{10}$

Write a formula for the general term (the nth term) of the arithmetic sequence. Then use the formula for a_n to find a_{20}, the 20th term of the sequence.

11) $a_1 = \frac{6}{5}$, $d = -\frac{3}{5}$

A) $a_n = -\frac{3}{5}n + \frac{9}{5}$; $a_{20} = -\frac{51}{5}$
B) $a_n = -\frac{3}{5}n + \frac{6}{5}$; $a_{20} = -\frac{54}{5}$
C) $a_n = \frac{6}{5}n - \frac{3}{5}$; $a_{20} = \frac{117}{5}$
D) $a_n = \frac{6}{5}n - \frac{9}{5}$; $a_{20} = \frac{111}{5}$

Find the indicated sum.

12) Find $1 + 3 + 5 + 7 + \ldots$, the sum of the first 85 positive odd integers.

A) 7136
B) 7225
C) 7140
D) 7229

Write the first five terms of the arithmetic sequence.

13) $a_n = a_{n-1} + 7.1$; $a_1 = -20$

A) -20, -12.9, -5.8, 1.3, 8.4
B) -21, -13.9, -6.8, 0.3, 7.4
C) -20, 7.1, -12.9, -5.8, 1.3
D) 7.1, -12.9, -32.9, -52.9, -72.9

Write a formula for the general term (the nth term) of the arithmetic sequence. Then use the formula for a_n to find a_{20}, the 20th term of the sequence.

14) 22, 16 , 10, 4, . . .

A) $a_n = 6n - 28$; $a_{20} = 92$
B) $a_n = -6n + 28$; $a_{20} = -92$
C) $a_n = -6n + 22$; $a_{20} = -98$
D) $a_n = 6n - 22$; $a_{20} = 98$

Find the indicated sum. Use the formula for the sum of the first n terms of a geometric sequence.

15) $\sum_{i=1}^{5} 3 \cdot 3^i$

A) 1089
B) 90
C) 1845
D) 117

Use the formula for the sum of the first n terms of a geometric sequence to solve.

16) Find the sum of the first 11 terms of the geometric sequence: $\frac{1}{6}, -\frac{1}{2}, \frac{3}{2}, -\frac{9}{2}, \frac{27}{2}, \ldots$

A) $\frac{22147}{3}$
B) $\frac{44287}{6}$
C) $\frac{44281}{6}$
D) $\frac{44285}{6}$

Solve the problem.

17) A pendulum bob swings through an arc 40 inches long on its first swing. Each swing thereafter, it swings only 70% as far as on the previous swing. How far will it swing altogether before coming to a complete stop? Round to the nearest inch when necessary.

A) 114 inches B) 67 inches C) 133 inches D) 57 inches

Find the sum of the infinite geometric series, if it exists.

18) $2 + \frac{1}{2} + \frac{1}{8} + \frac{1}{32} + \ldots$

A) $\frac{5}{2}$ B) $\frac{1}{2}$ C) $\frac{8}{3}$ D) does not exist

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

A statement S_n about the positive integers is given. Write statements S_k and S_{k+1}, simplifying S_{k+1} completely.

19) S_n: $1^2 + 4^2 + 7^2 + \ldots + (3n - 2)^2 = \frac{n(6n^2 - 3n - 1)}{2}$

Use mathematical induction to prove that the statement is true for every positive integer n.

20) 2 is a factor of $n^2 - n + 2$

A statement S_n about the positive integers is given. Write statements S_1, S_2, and S_3, and show that each of these statements is true.

21) S_n: $2 + 5 + 8 + \ldots + (3n - 1) = \frac{n(3n + 1)}{2}$

Use mathematical induction to prove that the statement is true for every positive integer n.

22) $1 + 4 + 7 + \ldots + (3n - 2) = \frac{n(3n - 1)}{2}$

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

Use the Binomial Theorem to expand the binomial and express the result in simplified form.

23) $(x^2 + 4y)^4$

A) $x^8 + 12x^6y + 96x^4y^2 + 192x^2y^3 + 256y^4$ B) $x^6 + 12x^5y + 96x^4y^2 + 192x^2y^3 + 256y^4$

C) $x^6 + 16x^5y + 24x^4y^2 + 16x^2y^3 + 4y^4$ D) $x^8 + 16x^6y + 96x^4y^2 + 256x^2y^3 + 256y^4$

Find the term indicated in the expansion.

24) $(3x + 4)^5$; 5th term

A) 960x B) 3840x C) 5120 D) $2880x^2$

Write the first three terms in the binomial expansion, expressing the result in simplified form.

25) $(x + 2)^{17}$

A) $x^{17} + 34x^{16} + 544x^{15}$ B) $x^{17} + 34x^{16} + 1088x^{15}$

C) $x^{17} + 32x^{16} + 1088x^{15}$ D) $x^{17} + 32x^{16} + 544x^{15}$

Find the term indicated in the expansion.

26) $(x^4 + y^2)^9$; 3rd term

A) $36x^{28}y^4$ B) $25920x^{11}y^4$ C) $36x^{11}y^4$ D) $25920x^{28}y^4$

Write the augmented matrix for the system of equations.

27)
$$\begin{aligned} 3x - 2y + 2z &= 16 \\ 2x + 9y - 2z &= 63 \\ 6x + 8y - 2z &= 80 \end{aligned}$$

A) $\begin{bmatrix} 3 & -2 & 2 \\ 2 & 9 & -2 \\ 6 & 8 & -2 \end{bmatrix}$

B) $\left[\begin{array}{ccc|c} 16 & 2 & -2 & 3 \\ 63 & -2 & 9 & 2 \\ 80 & -2 & 8 & 6 \end{array}\right]$

C) $\left[\begin{array}{ccc|c} 3 & 2 & 6 & 16 \\ -2 & 9 & 8 & 63 \\ 2 & -2 & -2 & 80 \end{array}\right]$

D) $\left[\begin{array}{ccc|c} 3 & -2 & 2 & 16 \\ 2 & 9 & -2 & 63 \\ 6 & 8 & -2 & 80 \end{array}\right]$

Write a system of linear equations in three variables, and then use matrices to solve the system.

28) There were approximately 100,000 vehicles sold at a particular dealership last year. The dealer tracks sales by age group for marketing purposes. The percentage of 36- to 59-year-old buyers and the percentage of buyers 60 and older combined exceeds the percentage of buyers 35 and younger by 24%. If the percentage of buyers in the oldest group is doubled, it is 32% less than the percentage of users in the middle group. Find the percentage of buyers in each of the three age groups.

A) 10% 35 and younger; 52% 36-59 year olds; 38% 60 and older

B) 38% 35 and younger; 52% 36-59 year olds; 10% 60 and older

C) 32% 35 and younger; 54% 36-59 year olds; 14% 60 and older

D) 40% 35 and younger; 49% 36-59 year olds; 11% 60 and older

Write the system of linear equations represented by the augmented matrix. Use x, y, z, and, if necessary, w for the variables.

29)
$$\left[\begin{array}{cccc|c} 5 & 1 & 0 & 6 & -12 \\ -1 & 7 & 1 & 0 & -3 \\ 8 & 0 & 0 & 2 & -10 \\ 0 & 9 & 0 & -9 & -5 \end{array}\right]$$

A)
$$\begin{aligned} 5x + y + 6w &= -12 \\ x + 7y + z &= -3 \\ 8x + 2w &= -10 \\ 9y + 9w &= -5 \end{aligned}$$

B)
$$\begin{aligned} 5x + y + 6w &= -12 \\ -x + 7y + z &= -3 \\ 8x + 2w &= -10 \\ 9y - 9w &= -5 \end{aligned}$$

C)
$$\begin{aligned} 5x + y + z + 6w &= -12 \\ -x + 7y + z + w &= -3 \\ 8x + y + z + 2w &= -10 \\ x + 9y + z - 9w &= -5 \end{aligned}$$

D)
$$\begin{aligned} 5x + y + 6z &= -12 \\ -x + 7y + z &= -3 \\ 8x + 2y &= -10 \\ 9x - 9y &= -5 \end{aligned}$$

Use Gaussian elimination to find the complete solution to the system of equations, or state that none exists.

30)
$$\begin{aligned} 3x + y + z - 2w &= 10 \\ 2x + 3y + 3z + w &= -5 \\ 2x + y + 4z + 11w &= 11 \end{aligned}$$

A) {(6, -4, -2, 1)} B) {(7, -1, -6, 2)}

C) {(w + 5, 3w - 7, -4w + 2, w)} D) {(2w + 3, 6w - 7, -10w + 8, w)}

31) $2x + y + 2z - 4w = 10$
$x + 3y + 2z - 11w = 17$
$3x + y + 7z - 21w = 0$

A) $\{(-3w + 5, 2w + 6, 4w - 3, w)\}$
B) $\{(w + 5, 8w + 4, -3w - 2, w)\}$
C) $\{(w - 5, 8w - 4, -3w + 2, w)\}$
D) $\{(3w + 5, 6w + 6, -4w - 3, w)\}$

32) $x + 3y + 2z = 11$
$4y + 9z = -12$
$x + 7y + 11z = -1$

A) $\{(-\frac{19z}{4} + 20, -\frac{9z}{4} + 3, z)\}$
B) $\{(\frac{19z}{4} + 20, \frac{9z}{4} + 3, z)\}$
C) $\{(\frac{19z}{4} + 20, -\frac{9z}{4} + 3, z)\}$
D) $\{(\frac{19z}{4} + 20, -\frac{9z}{4} - 3, z)\}$

33) $x + 8y + 8z = 8$
$7x + 7y + z = 1$
$8x + 15y + 9z = -9$

A) $\{(0, 0, 1)\}$
B) $\{(1, -1, 1)\}$
C) ▫
D) $\{(-1, 0, 1)\}$

Solve the problem.

34) Let $A = \begin{bmatrix} -1 & 0 \\ 3 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 3 \\ 3 & 1 \end{bmatrix}$. Find $A - B$.

A) $\begin{bmatrix} -2 & 3 \\ 6 & 4 \end{bmatrix}$
B) $\begin{bmatrix} -1 \end{bmatrix}$
C) $\begin{bmatrix} 0 & 3 \\ 0 & -2 \end{bmatrix}$
D) $\begin{bmatrix} 0 & -3 \\ 0 & 2 \end{bmatrix}$

Find the product AB, if possible.

35) $A = \begin{bmatrix} 9 & -7 & 1 \\ 7 & 7 & 7 \end{bmatrix}$, $B = \begin{bmatrix} -3 \\ 9 \\ 6 \end{bmatrix}$

A) $\begin{bmatrix} -84 & 84 \end{bmatrix}$
B) $\begin{bmatrix} -84 \\ 84 \end{bmatrix}$
C) $\begin{bmatrix} 9 & -7 & 1 \\ 7 & 7 & 7 \\ -3 & 9 & 6 \end{bmatrix}$
D) AB is not defined.

Solve the problem.

36) Let $A = \begin{bmatrix} 3 & 3 \\ 2 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 4 \\ -1 & 6 \end{bmatrix}$. Find $3A + B$.

A) $\begin{bmatrix} 9 & 13 \\ 5 & 18 \end{bmatrix}$
B) $\begin{bmatrix} 9 & 7 \\ 5 & 10 \end{bmatrix}$
C) $\begin{bmatrix} 9 & 13 \\ 1 & 10 \end{bmatrix}$
D) $\begin{bmatrix} 9 & 21 \\ 3 & 30 \end{bmatrix}$

37)

Let $A = \begin{bmatrix} -8 & 5 \\ -5 & 2 \\ 2 & 9 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -5 \\ 6 & 4 \\ 7 & 5 \end{bmatrix}$. Find A + B.

A) $\begin{bmatrix} -6 & 0 \\ -1 & 2 \\ 9 & -14 \end{bmatrix}$

B) $\begin{bmatrix} -10 & 10 \\ -11 & -2 \\ -5 & 18 \end{bmatrix}$

C) $\begin{bmatrix} -6 & 2 \\ 1 & 6 \\ 9 & 14 \end{bmatrix}$

D) $\begin{bmatrix} -6 & 0 \\ 1 & 6 \\ 9 & 14 \end{bmatrix}$

Find the inverse of the matrix, if possible.

38)

$A = \begin{bmatrix} -1 & 0 \\ 2 & -6 \end{bmatrix}$

A) $\begin{bmatrix} -\frac{1}{6} & 0 \\ -\frac{1}{3} & -1 \end{bmatrix}$

B) $\begin{bmatrix} -1 & 0 \\ \frac{1}{3} & -\frac{1}{6} \end{bmatrix}$

C) $\begin{bmatrix} -1 & 0 \\ -\frac{1}{3} & -\frac{1}{6} \end{bmatrix}$

D) No inverse

Find the products AB and BA to determine whether B is the multiplicative inverse of A.

39)

$A = \begin{bmatrix} -2 & 4 \\ 4 & -4 \end{bmatrix}, \quad B = \begin{bmatrix} \frac{1}{2} & \frac{1}{4} \\ \frac{1}{2} & \frac{1}{4} \end{bmatrix}$

A) $B = A^{-1}$

B) $B \neq A^{-1}$

Encode or decode the given message, as requested, numbering the letters of the alphabet 1 through 26 in their usual

40) Use the coding matrix $A = \begin{bmatrix} 2 & 1 \\ 5 & 3 \end{bmatrix}$ and its inverse $A^{-1} = \begin{bmatrix} 3 & -1 \\ -5 & 2 \end{bmatrix}$ to decode the cryptogram $\begin{bmatrix} 9 & 6 \\ 25 & 17 \end{bmatrix}$.

A) BEAD

B) CARE

C) CURB

D) DARE

Find the inverse of the matrix, if possible.

41)

$A = \begin{bmatrix} 1 & 0 & 0 \\ 9 & 1 & 0 \\ 0 & 7 & 1 \end{bmatrix}$

A) $\begin{bmatrix} 1 & 7 & -63 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}$

B) $\begin{bmatrix} 1 & 0 & 0 \\ -9 & 1 & 0 \\ 63 & -7 & 1 \end{bmatrix}$

C) $\begin{bmatrix} 1 & 0 & 0 \\ 7 & -1 & 0 \\ -63 & 9 & 1 \end{bmatrix}$

D) $\begin{bmatrix} 1 & 0 & 0 \\ 9 & 1 & 0 \\ 0 & 0 & 7 \end{bmatrix}$

Evaluate the determinant.

42) $\begin{vmatrix} \frac{1}{2} & \frac{1}{4} \\ -\frac{7}{6} & \frac{6}{11} \end{vmatrix}$

A) $\frac{13}{528}$ B) $-\frac{95}{132}$ C) $-\frac{5}{264}$ D) $\frac{149}{264}$

43) $\begin{vmatrix} 4 & 0 & 0 \\ 4 & 7 & 9 \\ 9 & 3 & 4 \end{vmatrix}$

A) 4 B) 9 C) -4 D) 220

Use Cramer's rule to solve the system.

44) $5x \quad + 8z = 55$
$3x + 5y + 9z = 79$
$-7x - 7y \quad = -56$

A) {(5, 5, 5)} B) {(3, 5, 5)} C) {(3, -5, -5)} D) {(4, 3, 5)}

Evaluate the determinant.

45) $\begin{vmatrix} \frac{1}{11} & -\frac{1}{4} \\ 4 & 11 \end{vmatrix}$

A) -2 B) $\frac{137}{44}$ C) 0 D) 2

Approximate the number using a calculator. Round your answer to three decimal places.

46) $2^{1.3}$

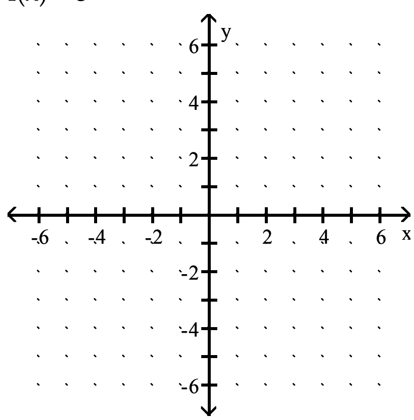
A) 1.690 B) 2.600 C) 2.762 D) 2.462

47) $2^{-2.1}$

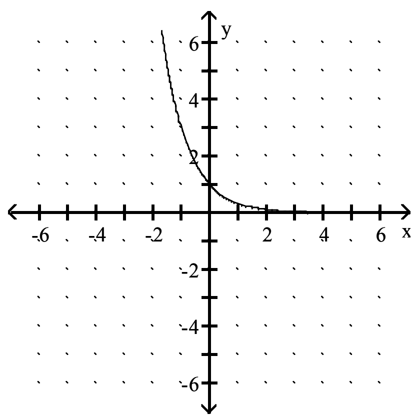
A) 4.410 B) 0.533 C) -4.200 D) 0.233

Graph the function by making a table of coordinates.

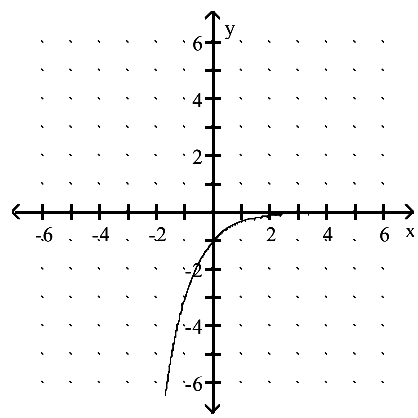
48) $f(x) = 3^x$



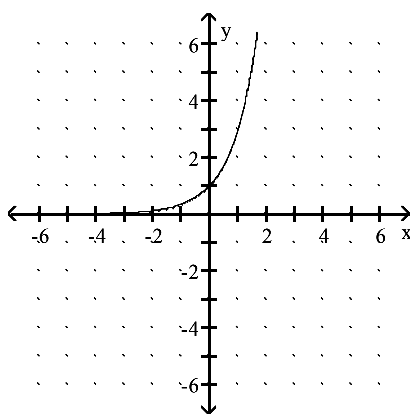
A)



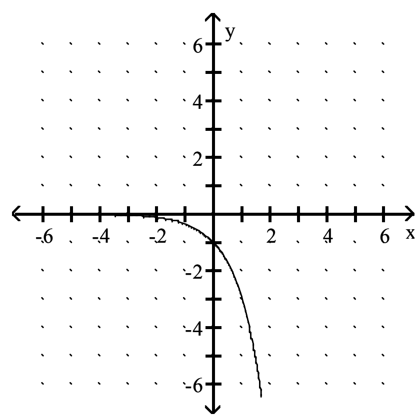
B)



C)



D)



Evaluate or simplify the expression without using a calculator.

49) log 10,000

A) 40 B) $\frac{2}{5}$ C) 4 D) $\frac{1}{4}$

Write the equation in its equivalent logarithmic form.

50) $3^{-2} = \frac{1}{9}$

A) $\log_3 \frac{1}{9} = -2$ B) $\log_{-2} \frac{1}{9} = 3$ C) $\log_{1/3} 3 = -2$ D) $\log_3 -2 = \frac{1}{9}$

Evaluate the expression without using a calculator.

51) $\log_7 \frac{1}{7}$

A) 1
B) -1
C) -7
D) 7

Find the domain of the logarithmic function.

52) $f(x) = \log_2 (x - 9)$

A) $(-9, \infty)$
B) $(9, \infty)$
C) $(-\infty, 0)$ or $(0, \infty)$
D) $(-\infty, 9)$ or $(9, \infty)$

Use properties of logarithms to expand the logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator.

53) $\ln \sqrt{\frac{x}{y}}$

A) $\ln \sqrt{x} - \ln \sqrt{y}$
B) $\frac{1}{2}\ln x - \ln y$
C) $\frac{1}{2}\ln \frac{x}{y}$
D) $\frac{1}{2}\ln x - \frac{1}{2}\ln y$

54) $\log (100x)$

A) $2 + \log x$
B) $20 + \log x$
C) $2\log x$
D) $2x$

55) $\log_4 \left(\frac{\sqrt{x}}{16}\right)$

A) $8 - \frac{1}{2} \log_4 x$
B) $-2\log_4 x$
C) $\frac{1}{2}\log_4 x - 2$
D) $\log_4 x - 2$

56) $\log_2 3^{-5}$

A) $-5\log_2 3$
B) $3\log_2 5$
C) $-10 \log 3$
D) $2\log_5 3$

Solve the problem.

57) The population of a particular country was 23 million in 1982; in 1991, it was 33 million. The exponential growth function $A = 23e^{kt}$ describes the population of this country t years after 1982. Use the fact that 9 years after 1982 the population increased by 10 million to find k to three decimal places.

A) 0.040
B) 0.050
C) 0.737
D) 0.256

Solve the logarithmic equation. Be sure to reject any value that is not in the domain of the original logarithmic expressions. Give the exact answer.

58) $\ln 2 + \ln (x - 1) = 0$

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

Solve the exponential equation. Express the solution set in terms of natural logarithms.

59) $4^{x+4} = 5^{2x+5}$

A) $\left\{\ln\left[\frac{5^5}{4^4} - \frac{4}{5^2}\right]\right\}$
B) $\left\{\frac{5 \ln 5 - 4 \ln 4}{\ln 4 - 2 \ln 5}\right\}$
C) $\{\ln 5 - \ln 4\}$
D) $\{7 \ln 5 - 5 \ln 4\}$

Solve the problem.

60) The population of a certain country is growing at a rate of 2.3% per year. How long will it take for this country's population to double? Use the formula $t = \frac{\ln 2}{k}$, which gives the time, t, for a population with growth rate k, to double. (Round to the nearest whole year.)

A) 32 years B) 31 years C) 29 years D) 30 years

61) The logistic growth function $f(t) = \frac{70{,}000}{1 + 1399.0e^{-1.6t}}$ models the number of people who have become ill with a particular infection t weeks after its initial outbreak in a particular community. How many people became ill with this infection when the epidemic began?

A) 1399 people B) 70,000 people C) 50 people D) 1400 people

62) The logistic growth function $f(t) = \frac{520}{1 + 9.4e^{-0.14t}}$ describes the population of a species of butterflies t months after they are introduced to a non-threatening habitat. How many butterflies are expected in the habitat after 20 months?

A) 521 butterflies B) 1000 butterflies C) 10,400 butterflies D) 331 butterflies

Solve.

63) The value of a particular investment follows a pattern of exponential growth. In the year 2000, you invested money in a money market account. The value of your investment t years after 2000 is given by the exponential growth model $A = 5000e^{0.068t}$. By what percentage is the account increasing each year?

A) 7.4% B) 6.8% C) 7.2% D) 7.5%

64) The value of a particular investment follows a pattern of exponential growth. In the year 2000, you invested money in a money market account. The value of your investment t years after 2000 is given by the exponential growth model $A = 3000e^{0.053t}$. When will the account be worth $5097?

A) 2009 B) 2011 C) 2012 D) 2010

Determine the maximum possible number of turning points for the graph of the function.

65) $g(x) = -\frac{1}{5}x + 2$

A) 0 B) 2 C) 3 D) 1

Write the equation of a polynomial function with the given characteristics. Use a leading coefficient of 1 or -1 and make the degree of the function as small as possible.

66) Crosses the x-axis at -4, 0, and 1; lies below the x-axis between -4 and 0; lies above the x-axis between 0 and 1.

A) $f(x) = x^3 + 3x^2 - 4x$ B) $f(x) = -x^3 + 3x^2 + 4x$

C) $f(x) = x^3 - 3x^2 - 4x$ D) $f(x) = -x^3 - 3x^2 + 4x$

67) Touches the x-axis at 0 and crosses the x-axis at 3; lies above the x-axis between 0 and 3.

A) $f(x) = x^3 + 3x^2$ B) $f(x) = -x^3 + 3x^2$ C) $f(x) = x^3 - 3x^2$ D) $f(x) = -x^3 - 3x^2$

Use the graph or table to determine a solution of the equation. Use synthetic division to verify that this number is a solution of the equation. Then solve the polynomial equation.

68) $2x^3 + 11x^2 + 17x + 6 = 0$

x	y1
-2	0
-1	-2
0	6
1	36
2	100
3	210

A) -2; The remainder is zero; 3, -2, and $-\frac{1}{2}$, or $\left\{-2, -\frac{1}{2}, 3\right\}$

B) -2; The remainder is zero; -3, -2, and $-\frac{1}{2}$, or $\left\{-3, -2, -\frac{1}{2}\right\}$

C) -2; The remainder is zero; -3, -2, and $\frac{1}{2}$, or $\left\{-3, -2, \frac{1}{2}\right\}$

D) -2; The remainder is zero; -3, 2, and $-\frac{1}{2}$, or $\left\{-3, -\frac{1}{2}, 2\right\}$

Divide using long division.

69) $(-2x^5 - x^3 + 5x^2 + 12x - 10) \div (x^2 - 2)$

A) $-2x^3 - 5x - 5 + \frac{2x}{x^2 - 2}$

B) $-2x^3 - 5x + 5 + \frac{2x - 20}{x^2 - 2}$

C) $-2x^3 - 5x + 5 + \frac{2x}{x^2 - 2}$

D) $-2x^3 - 5x + 5 - \frac{2x}{x^2 - 2}$

Use synthetic division and the Remainder Theorem to find the indicated function value.

70) $f(x) = 6x^4 + 9x^3 + 5x^2 - 6x + 24$; $f(-3)$

A) 642 B) -93 C) 330 D) 954

Divide using synthetic division.

71) $\frac{5x^3 - 26x^2 - 29x + 30}{x - 6}$

A) $5x^2 + 4x - 5$ B) $\frac{5}{6}x^2 - \frac{13}{3}x - \frac{29}{6}$ C) $-5x^2 + 6x - 5$ D) $-5x^2 - 6x + 5$

Factor the polynomial as the product of factors that are irreducible over the real numbers. Then write the polynomial in completely factored form involving complex nonreal, or imaginary numbers.

72) $f(x) = x^4 + 2x^3 - 4x^2 + 8x - 32$ (Hint: $x^2 + 4$ is a factor.)

A) $f(x) = (x - 4)(x - 2)(x - 2)(x + 2)$

B) $f(x) = (x - 1)(x + 8)(x - 2i)(x + 2i)$

C) $f(x) = (x + 4)(x - 2)(x - 2i)(x + 2i)$

D) $f(x) = (x - i\sqrt{8})(x + i\sqrt{8})(x - 2)(x + 2)$

Find a rational zero of the polynomial function and use it to find all the zeros of the function.

73) $f(x) = x^3 - 6x^2 - x + 6$

A) {-1, 2, -3} B) {1, -1, -6} C) {1, 2, 3} D) {1, -1, 6}

Solve the polynomial equation. In order to obtain the first root, use synthetic division to test the possible rational roots.

74) $3x^3 - x^2 - 21x + 7 = 0$

A) $\{\frac{1}{3}, \sqrt{7}, -\sqrt{7}\}$
B) $\{-3, \sqrt{7}, -\sqrt{7}\}$
C) $\{3, \sqrt{7}, -\sqrt{7}\}$
D) $\{-\frac{1}{3}, \sqrt{7}, -\sqrt{7}\}$

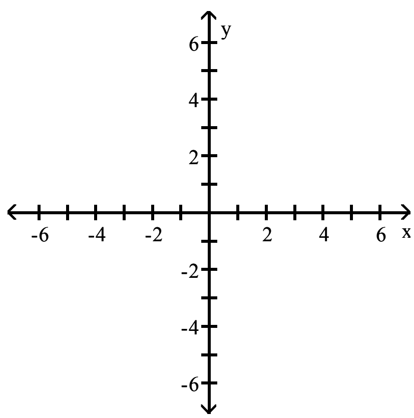
Find a rational zero of the polynomial function and use it to find all the zeros of the function.

75) $f(x) = x^4 - 7x^3 + 21x^2 - 23x - 52$

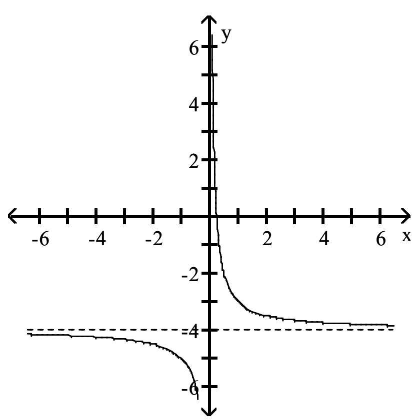
A) $\{1, -4, 2 + \sqrt{3}, 2 - \sqrt{3}\}$
B) $\{-1, 4, 2 + 3i, 2 - 3i\}$
C) $\{1, -4, 2 + 3i, 2 - 3i\}$
D) $\{-1, 4, 2 + 4i, 2 - 4i\}$

Use transformations of $f(x) = \frac{1}{x}$ or $f(x) = \frac{1}{x^2}$ to graph the rational function.

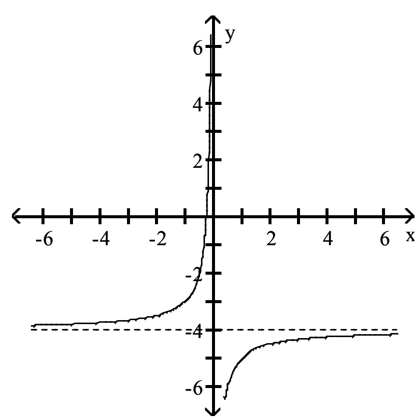
76) $f(x) = \frac{1}{x} - 4$



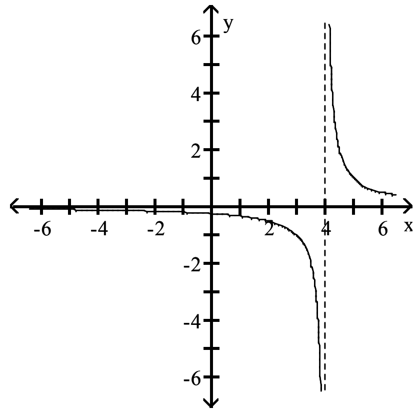
A)



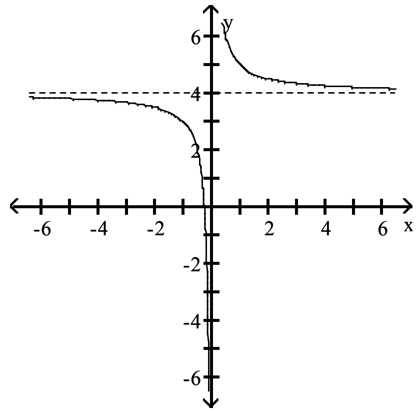
B)



C)

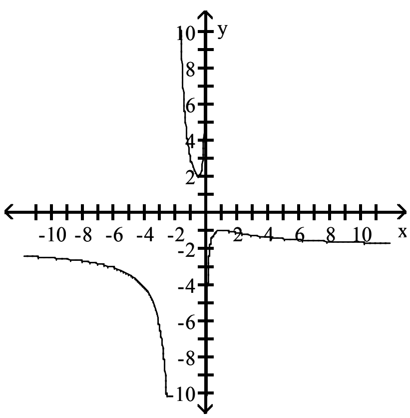


D)



Use the graph of the rational function shown to complete the statement.

77)

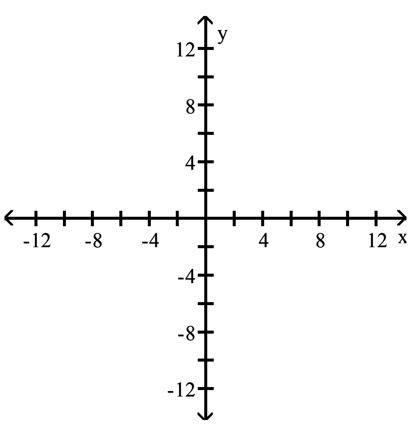


As $x \to -2^{+}$, $f(x) \to$?

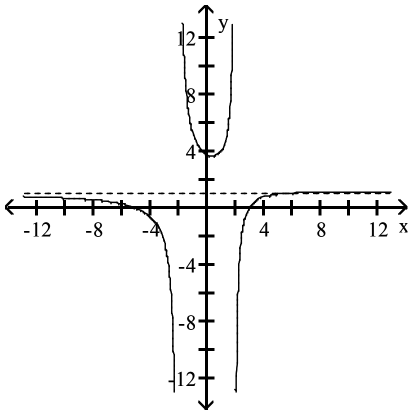
A) -2 B) 2 C) $-\infty$ D) $+\infty$

Graph the rational function.

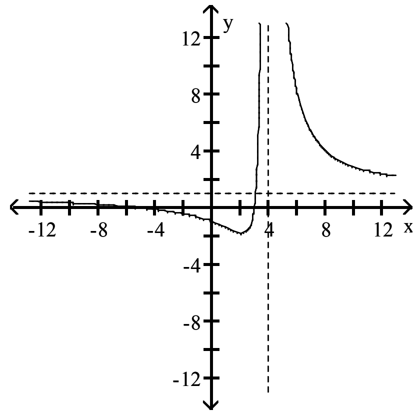
78) $f(x) = \dfrac{x^2 + 2x - 15}{(x - 4)^2}$



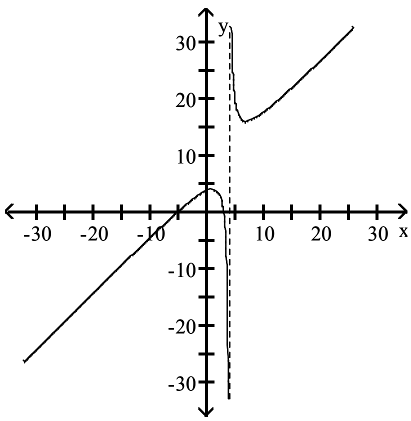
A)



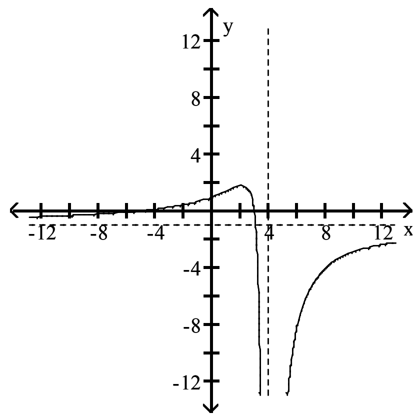
B)



C)



D)



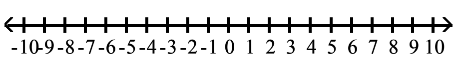
Find the indicated intercept(s) of the graph of the function.

79) x-intercepts of $f(x) = \dfrac{x + 4}{x^2 + 6x - 5}$

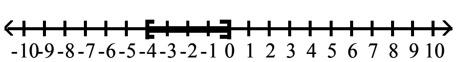
A) (-4, 0) B) $\left(\dfrac{4}{5}, 0\right)$ C) (4, 0) D) none

Solve the polynomial inequality and graph the solution set on a number line. Express the solution set in interval notation.

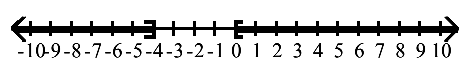
80) $x^2 + 4x \geq 0$



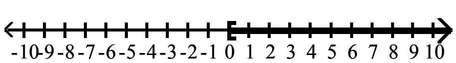
A) [-4, 0]



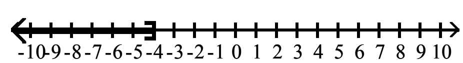
B) (-∞, -4] ∪ [0, ∞]



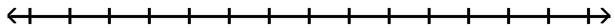
C) [0, ∞]



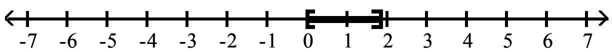
D) (-∞, -4]



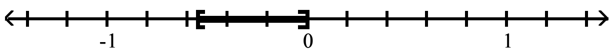
81) $11x^2 - 6x \le 0$



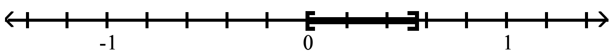
A) $\left[0, \dfrac{11}{6}\right]$



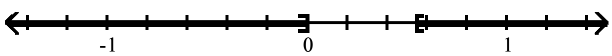
B) $\left[-\dfrac{6}{11}, 0\right]$



C) $\left[0, \dfrac{6}{11}\right]$



D) $(-\infty, 0] \cup \left[\dfrac{6}{11}, \infty\right)$



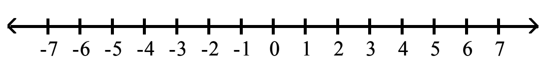
Solve the problem.

82) The average cost per unit, y, of producing x units of a product is modeled by $y = \dfrac{650{,}000 + 0.35x}{x}$. Describe the company's production level so that the average cost of producing each unit does not exceed $6.85.

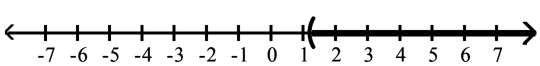
A) Not more than 100,000 units
B) At least 100,000 units
C) Not more than 200,000 units
D) At least 200,000 units

Solve the polynomial inequality and graph the solution set on a number line. Express the solution set in interval notation.

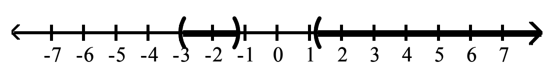
83) $25x^3 + 75x^2 - 36x - 108 > 0$



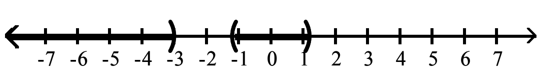
A) $\left(\dfrac{6}{5}, \infty\right)$



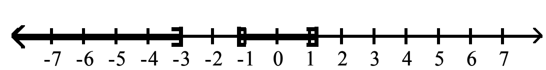
B) $\left(-3, -\dfrac{6}{5}\right) \cup \left(\dfrac{6}{5}, \infty\right)$



C) $(-\infty, -3) \cup \left(-\dfrac{6}{5}, \dfrac{6}{5}\right)$

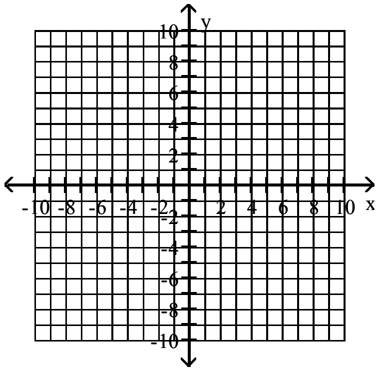


D) $(-\infty, -3] \cup \left[-\dfrac{6}{5}, \dfrac{6}{5}\right]$

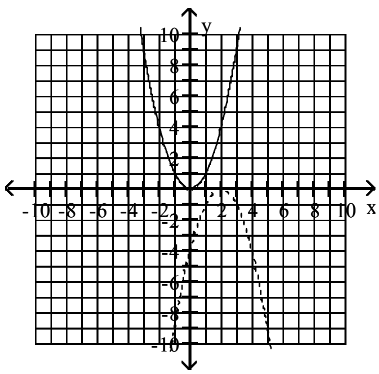


Begin by graphing the standard quadratic function $f(x) = x^2$. Then use transformations of this graph to graph the given function.

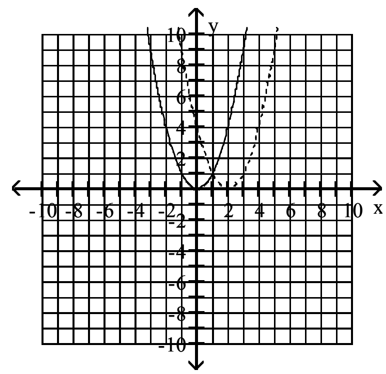
84) $h(x) = -(x - 2)^2$



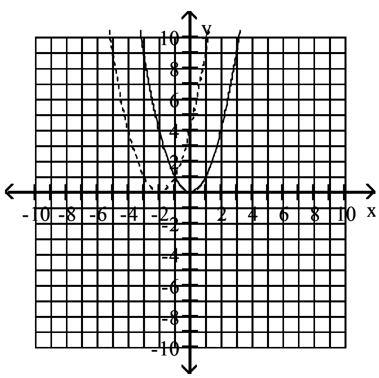
A)



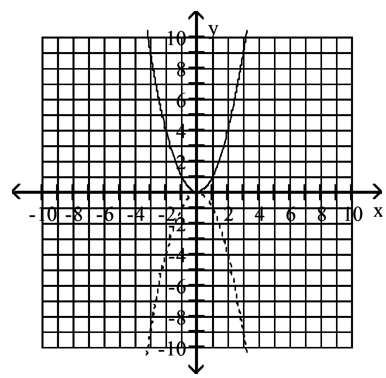
B)



C)

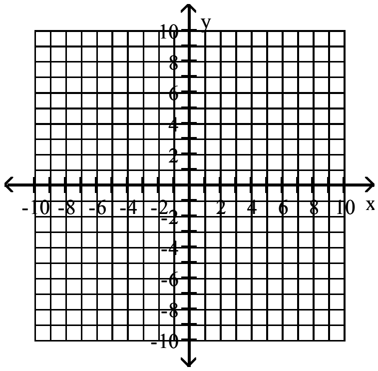


D)

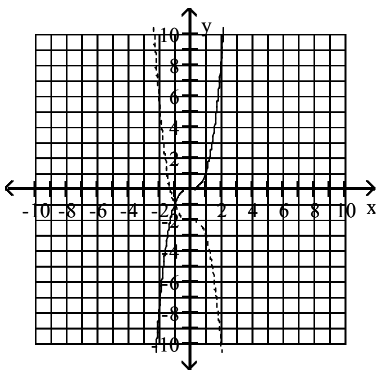


Begin by graphing the standard cubic function $f(x) = x^3$. Then use transformations of this graph to graph the given function.

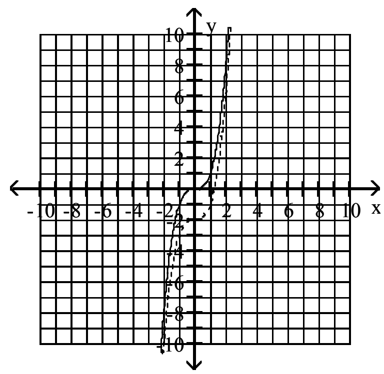
85) $g(x) = -x^3 + 2$



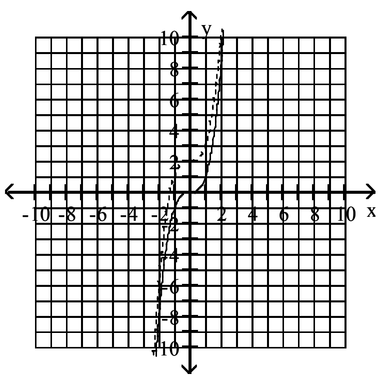
A)



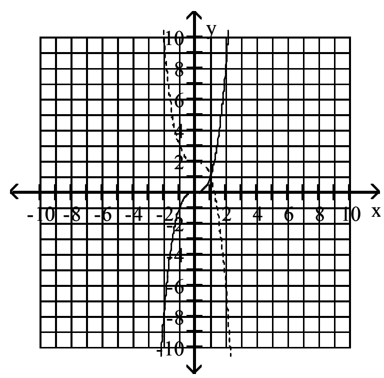
B)



C)

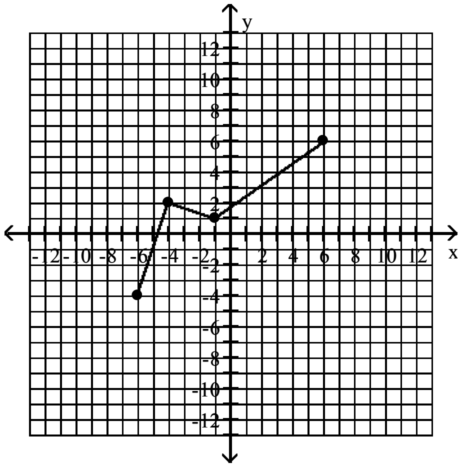


D)

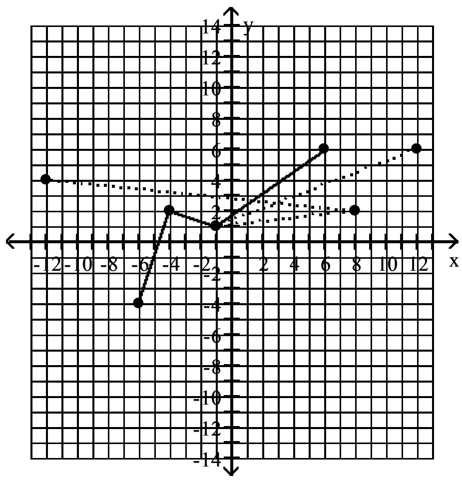


Use the graph of y = f(x) to graph the given function g.

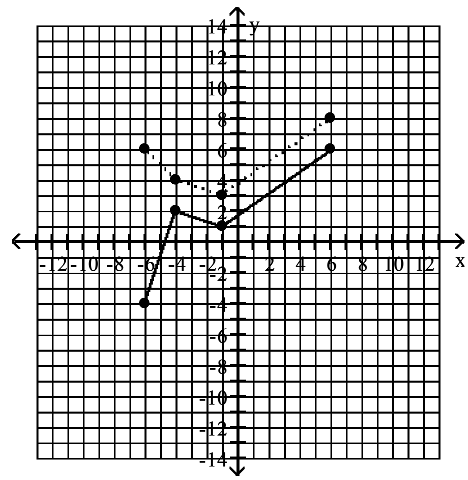
86) $g(x) = 2f(x)$



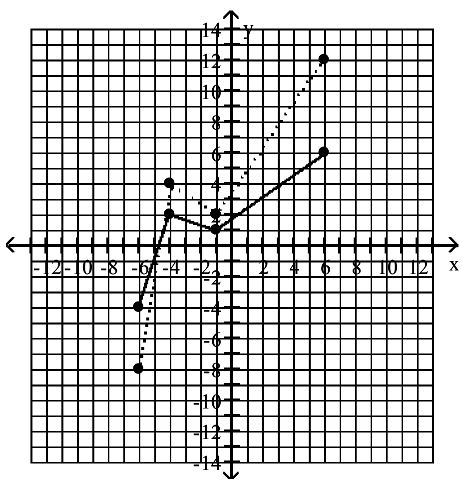
A)



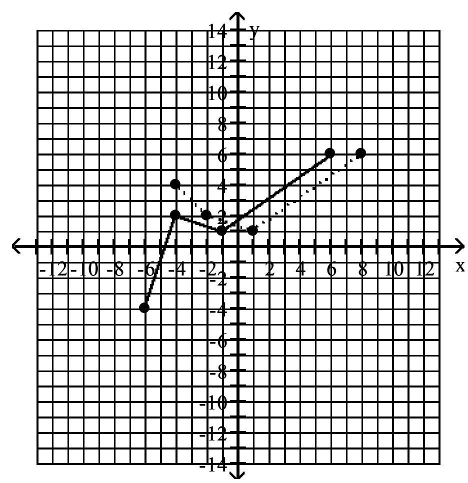
B)



C)



D)



Find the domain of the function.

87) $f(x) = x^2 + 8$

A) $(-\infty, -8) \cup (-8, \infty)$ B) $(-8, \infty)$ C) $(-\infty, \infty)$ D) $[-8, \infty)$

Find the domain of the composite function f∘g.

88) $f(x) = x + 3, \qquad g(x) = \dfrac{1}{x + 7}$

A) (-∞, -7) or (-7, -3) or (-3, ∞)
B) (-∞, -7) or (-7, ∞)
C) (-∞, ∞)
D) (-∞, -10) or (-10, ∞)

Find functions f and g so that h(x) = (f ∘ g)(x).

89) $h(x) = \dfrac{9}{x^2} + 6$

A) $f(x) = 9/x^2$, $g(x) = 6$
B) $f(x) = 1/x$, $g(x) = 9/x + 6$
C) $f(x) = x + 6$, $g(x) = 9/x^2$
D) $f(x) = x$, $g(x) = 9/x + 6$

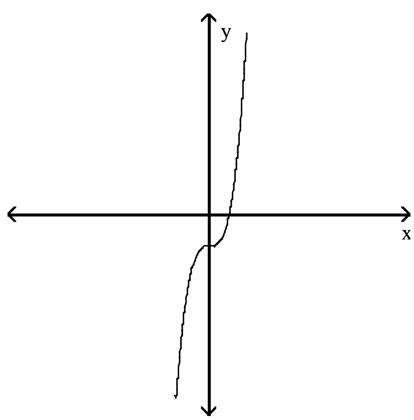
For the given functions f and g , find the indicated composition.

90) $f(x) = 17x^2 - 10x$, $g(x) = 19x - 10$
$(f \circ g)(12)$

A) 805,728
B) 507,504
C) 761,506
D) 44,222

Does the graph represent a function that has an inverse function?

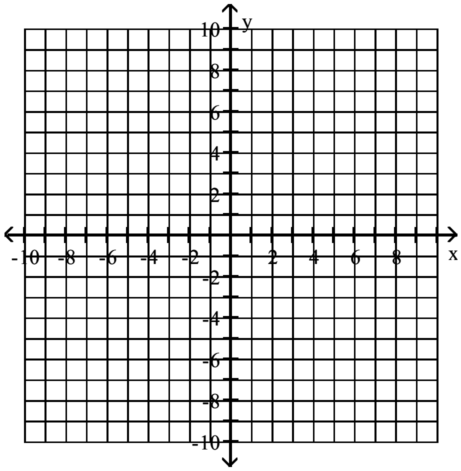
91)



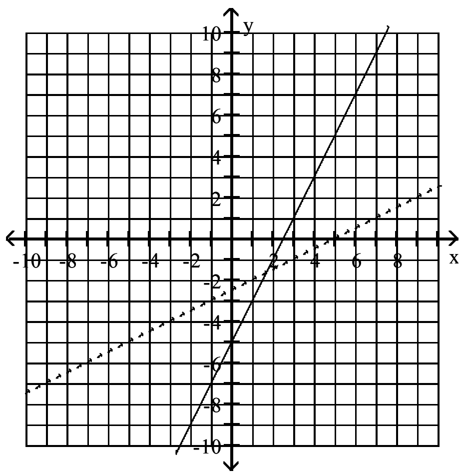
A) Yes
B) No

Graph f as a solid line and f^{-1} as a dashed line in the same rectangular coordinate space. Use interval notation to give the domain and range of f and f^{-1}.

92) f(x) = 2x - 5

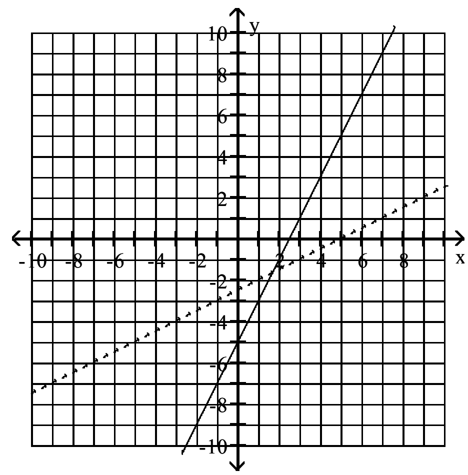


A)



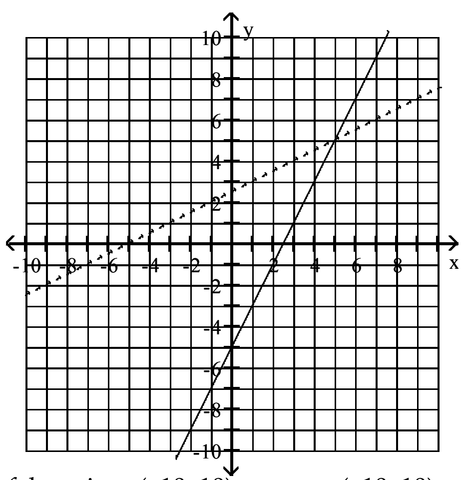
f domain = (-10, 10); range = (-10, 10)
f^{-1} domain = (-10, 10); range = (-10, 10)

B)



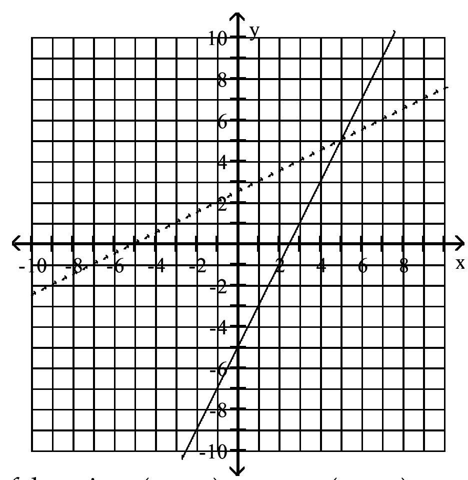
f domain = (-∞, ∞); range = (-∞, ∞)
f^{-1} domain = (-∞, ∞); range = (-∞, ∞)

C)



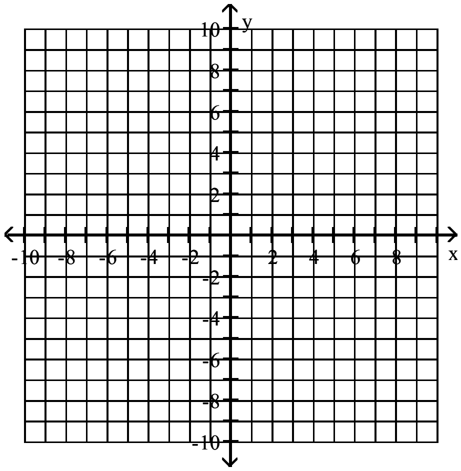
f domain = (-10, 10); range = (-10, 10)
f^{-1} domain = (-10, 10); range = (-10, 10)

D)

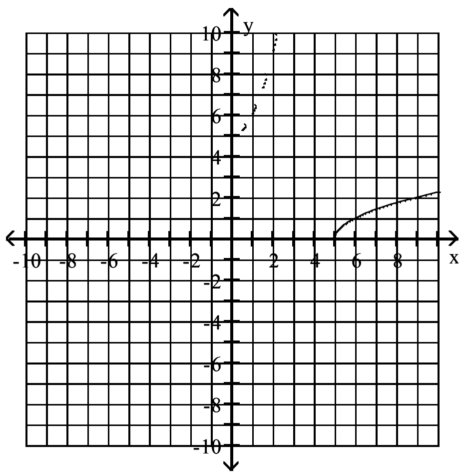


f domain = (-∞, ∞); range = (-∞, ∞)
f^{-1} domain = (-∞, ∞); range = (-∞, ∞)

93) $f(x) = \sqrt{x - 5}$

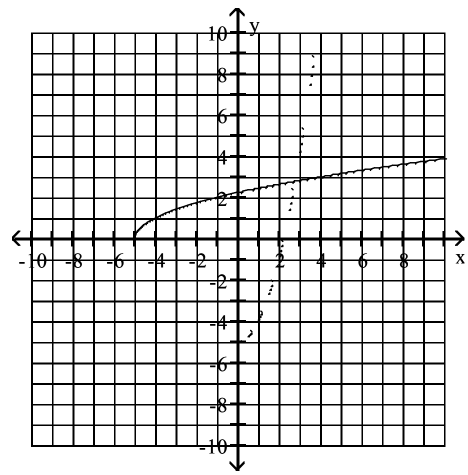


A)



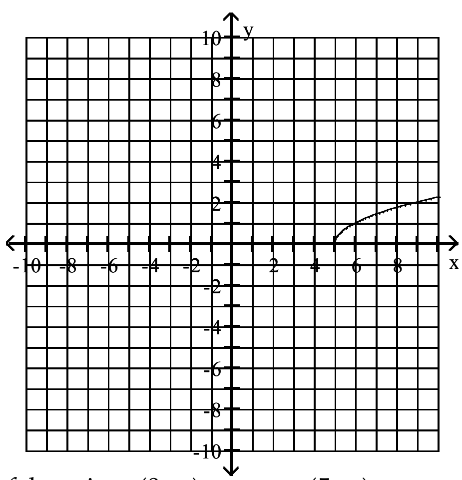
f domain = (0, ∞); range = (5, ∞)
f^{-1} domain = (5, ∞); range = (0, ∞)

B)



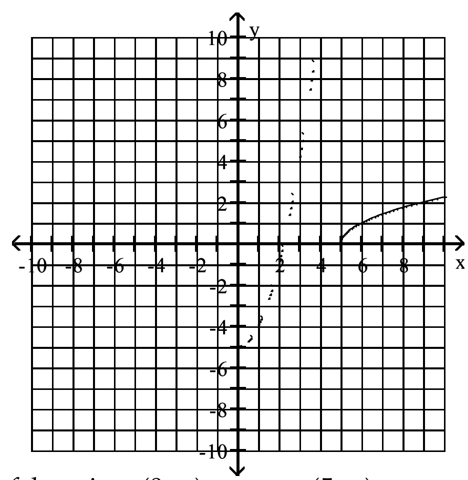
f domain = (0, ∞); range = (-5, ∞)
f^{-1} domain = (-5, ∞); range = (0, ∞)

C)



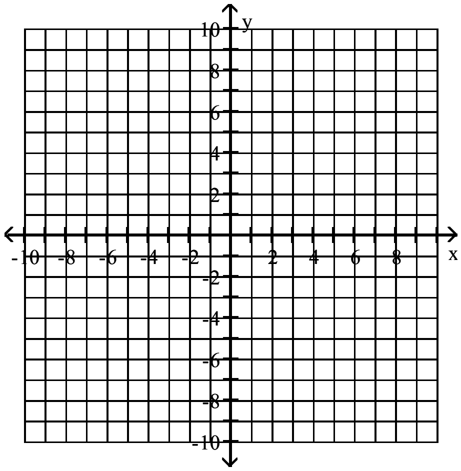
f domain = (0, ∞); range = (5, ∞)
f^{-1} Has no inverse.

D)

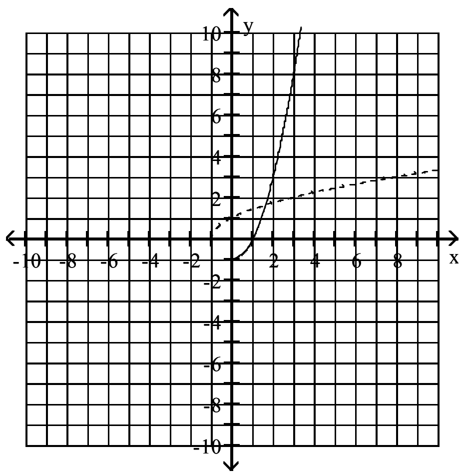


f domain = (0, ∞); range = (5, ∞)
f^{-1} domain = (-5, ∞); range = (0, ∞)

94) $f(x) = x^2 - 1, x \geq 0$

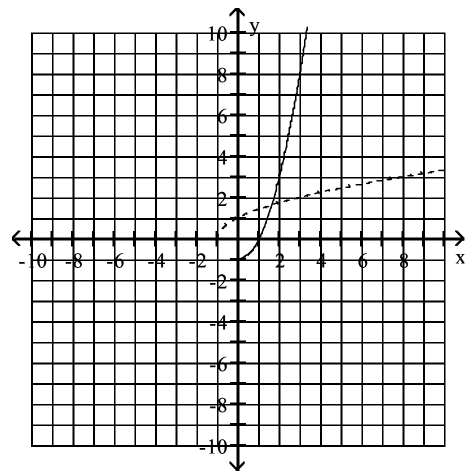


A)



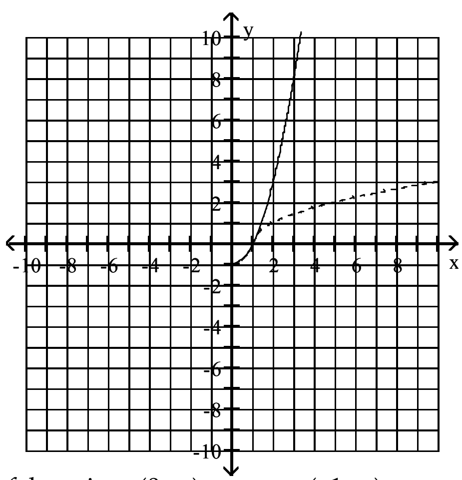
f domain = $(-\infty, \infty)$; range = $(-1, \infty)$
f^{-1} domain = $(-\infty, \infty)$; range = $(-1, \infty)$

B)



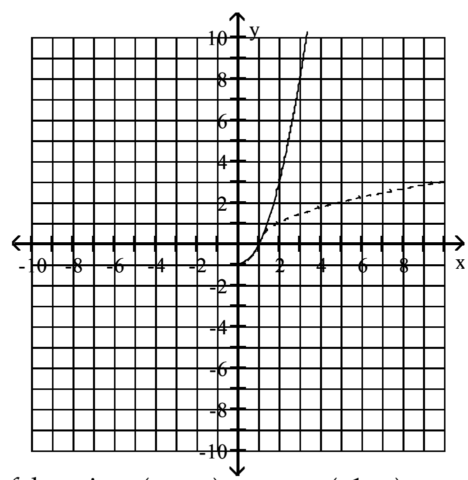
f domain = $(0, \infty)$; range = $(-1, \infty)$
f^{-1} domain = $(0, \infty)$; range = $(-1, \infty)$

C)



f domain = $(0, \infty)$; range = $(-1, \infty)$
f^{-1} domain = $(0, \infty)$; range = $(1, \infty)$

D)



f domain = $(-\infty, \infty)$; range = $(-1, \infty)$
f^{-1} domain = $(-\infty, \infty)$; range = $(1, \infty)$

Solve.

95) A vendor has learned that, by pricing caramel apples at \$1.00, sales will reach 125 caramel apples per day. Raising the price to \$1.75 will cause the sales to fall to 95 caramel apples per day. Let y be the number of caramel apples the vendor sells at x dollars each. Write a linear equation that models the number of caramel apples sold per day when the price is x dollars each.

A) $y = -\frac{1}{40}x + \frac{4999}{40}$ B) $y = 40x + 85$ C) $y = -40x + 165$ D) $y = -40x - 165$

Use the given conditions to write an equation for the line in point-slope form.

96) Passing through (-4, -3) and (-8, -6)

A) $y - 3 = \frac{3}{4}(x - 4)$ or $y - 6 = \frac{3}{4}(x - 8)$ B) $y + 3 = \frac{3}{4}x - 4$ or $y + 6 = \frac{3}{4}x + 3$

C) $y + 3 = \frac{3}{4}(x + 8)$ or $y + 6 = \frac{3}{4}(x + 4)$ D) $y + 3 = \frac{3}{4}(x + 4)$ or $y + 6 = \frac{3}{4}(x + 8)$

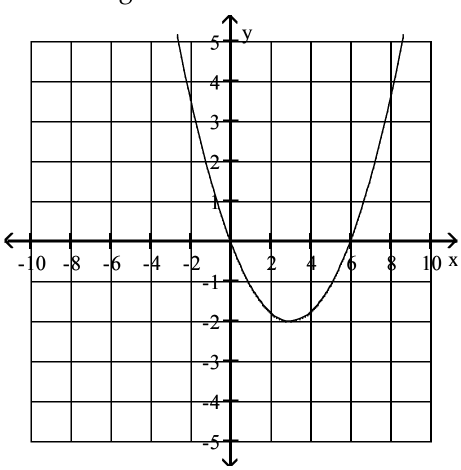
Solve.

97) A vendor has learned that, by pricing hot dogs at \$1.25, sales will reach 123 hot dogs per day. Raising the price to \$1.75 will cause the sales to fall to 101 hot dogs per day. Let y be the number of hot dogs the vendor sells at x dollars each. Write a linear equation that models the number of hot dogs sold per day when the price is x dollars each.

A) $y = -\frac{1}{44}x + \frac{21643}{176}$ B) $y = 44x + 68$ C) $y = -44x - 178$ D) $y = -44x + 178$

Identify the intervals where the function is changing as requested.

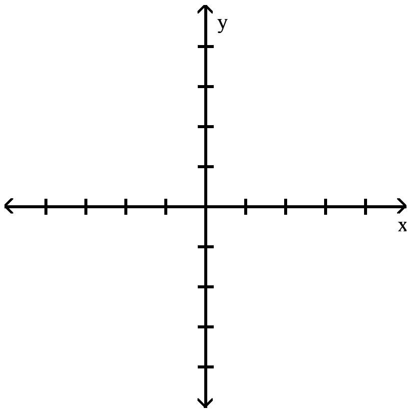
98) Decreasing



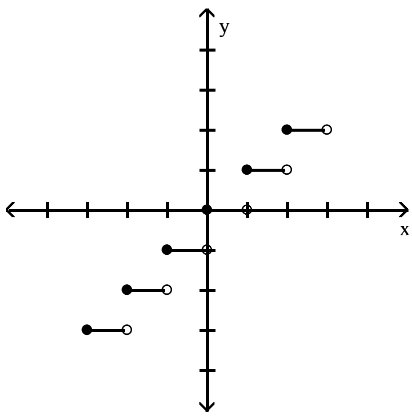
A) (0, -2) B) (-∞, -2) C) (-∞, 3) D) (0, 3)

Graph the function.

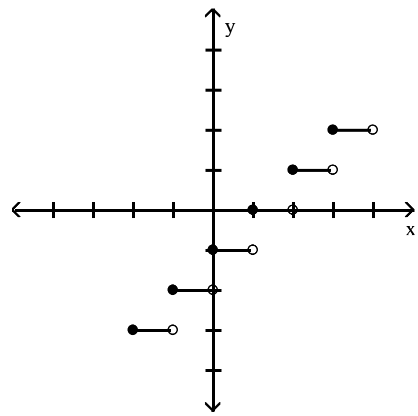
99) f(x) = int (x)- 1



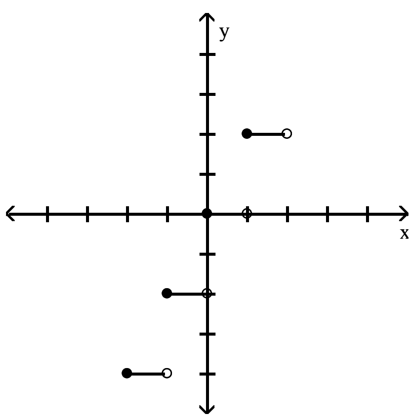
A)



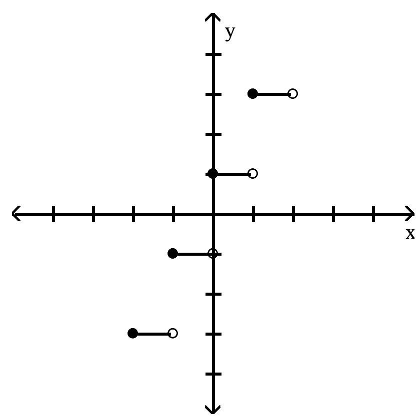
B)



C)

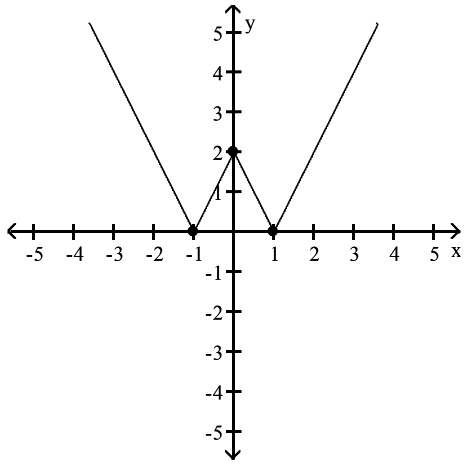


D)



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

100) Find the numbers, if any, at which f has a relative maximum. What are the relative maxima?



A) f has a relative maximum at x = 1; the relative maximum is 2

B) f has a relative maximum at x = -1 and 1; the relative maximum is 0

C) f has a relative maximum at x = 0; the relative maximum is 2

D) f has no relative maximum

1) B
ID: CA4Z 2.2.3-6
Objective: (2.2) Identify Intervals on Which a Function Increases, Decreases, or is Constant

2) A
ID: CA4Z 2.3.1-8
Objective: (2.3) Calculate a Line's Slope

3) A
ID: CA4Z 2.5.3-4
Objective: (2.5) Use Horizontal Shifts to Graph Functions

4) B
ID: CA4Z 3.2.2-16
Objective: (3.2) Recognize Characteristics of Graphs of Polynomial Functions

5) B
ID: CA4Z 4.1.2-21
Objective: (4.1) Graph Exponential Functions

6) A
ID: CA4Z 6.1.1-7
Objective: (6.1) Write the Augmented Matrix for a Linear System

7) B
ID: CA4Z 8.1.3-6
Objective: (8.1) Use Factorial Notation

8) C
ID: CA4Z 8.1.1-8
Objective: (8.1) Find Particular Terms of a Sequence from the General Term

9) D
ID: CA4Z 8.1.3-5
Objective: (8.1) Use Factorial Notation

10) A
ID: CA4Z 8.1.3-1
Objective: (8.1) Use Factorial Notation

11) A
ID: CA4Z 8.2.3-10
Objective: (8.2) Use the Formula for the General Term of an Arithmetic Sequence

12) B
ID: CA4Z 8.2.4-6
Objective: (8.2) Use the Formula for the Sum of the First n Terms of an Arithmetic Sequence

13) A
ID: CA4Z 8.2.2-9
Objective: (8.2) Write Terms of an Arithmetic Sequence

14) B
ID: CA4Z 8.2.3-9
Objective: (8.2) Use the Formula for the General Term of an Arithmetic Sequence

15) A
ID: CA4Z 8.3.4-11
Objective: (8.3) Use the Formula for the Sum of the First n Terms of a Geometric Sequence

16) B
ID: CA4Z 8.3.4-9
Objective: (8.3) Use the Formula for the Sum of the First n Terms of a Geometric Sequence

17) C
ID: CA4Z 8.3.6-12
Objective: (8.3) Use the Formula for the Sum of an Infinite Geometric Series

18) C
ID: CA4Z 8.3.6-1
Objective: (8.3) Use the Formula for the Sum of an Infinite Geometric Series

19) S_k: $1^2 + 4^2 + 7^2 + \ldots + (3k - 2)^2 = \dfrac{k(6k^2 - 3k - 1)}{2}$

S_{k+1}: $1^2 + 4^2 + 7^2 + \ldots + (3k + 1)^2 = \dfrac{(k + 1)(6k^2 + 9k + 2)}{2}$

ID: CA4Z 8.4.1-6
Objective: (8.4) Understand the Principle of Mathematical Induction

20) Show S_1 is true: $1^2 - 1 + 2 = 2$; 2 is a factor of 2

Assume that S_k is true: $k^2 - k + 2$; 2 is a factor of $k^2 - k + 2$

Show that if S_k is true, then S_{k+1} is true:

$S_{k+1} = (k + 1)^2 - (k + 1) + 2 = k^2 + k + 2 = (k^2 - k + 2) + 2k$

$(k^2 - k + 2)$ is S_k and 2 is a factor of 2k

Since 2 is a factor of S_{k+1} is true, the statement is true for all values of n.

ID: CA4Z 8.4.2-5
Objective: (8.4) Prove Statements Using Mathematical Induction

21) S_1: $2 \stackrel{?}{=} \dfrac{1(3 \cdot 1 + 1)}{2}$

$2 \stackrel{?}{=} \dfrac{1 \cdot 4}{2}$

$2 = 2$ ▫

S_2: $2 + 5 \stackrel{?}{=} \dfrac{2(3 \cdot 2 + 1)}{2}$

$7 \stackrel{?}{=} \dfrac{2 \cdot 7}{2}$

$7 = 7$ ▫

S_3: $2 + 5 + 8 \stackrel{?}{=} \dfrac{3(3 \cdot 3 + 1)}{2}$

$15 \stackrel{?}{=} \dfrac{3 \cdot 10}{2}$

$15 = 15$ ▫

ID: CA4Z 8.4.1-1
Objective: (8.4) Understand the Principle of Mathematical Induction

22) S_1: $1 \stackrel{?}{=} \dfrac{1(3 \cdot 1 - 1)}{2}$

$1 \stackrel{?}{=} \dfrac{1 \cdot 2}{2}$

$1 = 1$ ▫

S_k: $1 + 4 + 7 + . . . + (3k - 2) = \dfrac{k(3k - 1)}{2}$

S_{k+1}: $1 + 4 + 7 + . . . + (3k + 1) = \dfrac{(k + 1)(3k + 2)}{2}$

We work with S_k. Because we assume that S_k is true, we add the next consecutive term, namely $3(k+1) - 2$, to both sides.

$1 + 4 + 7 + . . . + (3k - 2) + (3(k + 1) - 2) = \dfrac{k(3k - 1)}{2} + (3(k + 1) - 2)$

$1 + 4 + 7 + . . . + (3k + 1) = \dfrac{k(3k - 1)}{2} + (3k + 1)$

$1 + 4 + 7 + . . . + (3k + 1) = \dfrac{k(3k - 1)}{2} + \dfrac{2(3k + 1)}{2}$

$1 + 4 + 7 + . . . + (3k + 1) = \dfrac{3k^2 + 5k + 2)}{2}$

$1 + 4 + 7 + . . . + (3k + 1) = \dfrac{(k + 1)(3k + 2)}{2}$

We have shown that if we assume that S_k is true, and we add $3(k+1) - 2$ to both sides of S_k, then S_{k+1} is also true. By the principle of mathematical induction, the statement S_n is true for every positive integer n.

ID: CA4Z 8.4.2-3

Objective: (8.4) Prove Statements Using Mathematical Induction

23) D

ID: CA4Z 8.5.2-8

Objective: (8.5) Expand a Binomial Raised to a Power

24) B

ID: CA4Z 8.5.3-11

Objective: (8.5) Find a Particular Term in a Binomial Expansion

25) A

ID: CA4Z 8.5.3-1

Objective: (8.5) Find a Particular Term in a Binomial Expansion

26) A

ID: CA4Z 8.5.3-9

Objective: (8.5) Find a Particular Term in a Binomial Expansion

27) D

ID: CA4Z 6.1.1-1

Objective: (6.1) Write the Augmented Matrix for a Linear System

28) B

ID: CA4Z 6.1.4-9

Objective: (6.1) Use Matrices and Gauss-Jordan Elimination to Solve Systems

29) B
ID: CA4Z 6.1.1-6
Objective: (6.1) Write the Augmented Matrix for a Linear System

30) C
ID: CA4Z 6.2.2-4
Objective: (6.2) Apply Gaussian Elimination to Systems with More Variables than Equations

31) A
ID: CA4Z 6.2.2-5
Objective: (6.2) Apply Gaussian Elimination to Systems with More Variables than Equations

32) D
ID: CA4Z 6.2.1-6
Objective: (6.2) Apply Gaussian Elimination to Systems Without Unique Solutions

33) C
ID: CA4Z 6.2.1-3
Objective: (6.2) Apply Gaussian Elimination to Systems Without Unique Solutions

34) D
ID: CA4Z 6.3.3-2
Objective: (6.3) Add and Subtract Matrices

35) B
ID: CA4Z 6.3.6-6
Objective: (6.3) Multiply Matrices

36) A
ID: CA4Z 6.3.4-3
Objective: (6.3) Perform Scalar Multiplication

37) D
ID: CA4Z 6.3.3-4
Objective: (6.3) Add and Subtract Matrices

38) C
ID: CA4Z 6.4.1-12
Objective: (6.4) Find the Multiplicative Inverse of a Square Matrix

39) B
ID: CA4Z 6.4.1-3
Objective: (6.4) Find the Multiplicative Inverse of a Square Matrix

40) A
ID: CA4Z 6.4.3-5
Objective: (6.4) Encode and Decode Messages

41) B
ID: CA4Z 6.4.1-17
Objective: (6.4) Find the Multiplicative Inverse of a Square Matrix

42) D
ID: CA4Z 6.5.1-5
Objective: (6.5) Evaluate a Second-Order Determinant

43) A
ID: CA4Z 6.5.3-1
Objective: (6.5) Evaluate a Third-Order Determinant

44) B
ID: CA4Z 6.5.4-3
Objective: (6.5) Solve a System of Linear Equations in Three Variables Using Cramer's Rule

45) D
ID: CA4Z 6.5.1-4
Objective: (6.5) Evaluate a Second-Order Determinant

46) D
ID: CA4Z 4.1.1-1
Objective: (4.1) Evaluate Exponential Functions

47) D
ID: CA4Z 4.1.1-2
Objective: (4.1) Evaluate Exponential Functions

48) C
ID: CA4Z 4.1.2-1
Objective: (4.1) Graph Exponential Functions

49) C
ID: CA4Z 4.2.7-1
Objective: (4.2) Use Common Logarithms

50) A
ID: CA4Z 4.2.2-2
Objective: (4.2) Change From Exponential to Logarithmic Form

51) B
ID: CA4Z 4.2.3-7
Objective: (4.2) Evaluate Logarithms

52) B
ID: CA4Z 4.2.6-2
Objective: (4.2) Find the Domain of a Logarithmic Function

53) D
ID: CA4Z 4.3.4-11
Objective: (4.3) Expand Logarithmic Expressions

54) A
ID: CA4Z 4.3.1-4
Objective: (4.3) Use the Product Rule

55) C
ID: CA4Z 4.3.4-7
Objective: (4.3) Expand Logarithmic Expressions

56) A
ID: CA4Z 4.3.3-5
Objective: (4.3) Use the Power Rule

57) A
ID: CA4Z 4.4.5-14
Objective: (4.4) Solve Applied Problems Involving Exponential and Logarithmic Equations

58) B
ID: CA4Z 4.4.3-13
Objective: (4.4) Use the Definition of a Logarithm to Solve Logarithmic Equations

59) B
ID: CA4Z 4.4.2-5
Objective: (4.4) Use Logarithms to Solve Exponential Equations

60) D
ID: CA4Z 4.4.5-15
Objective: (4.4) Solve Applied Problems Involving Exponential and Logarithmic Equations

61) C
ID: CA4Z 4.5.2-4
Objective: (4.5) Use Logistic Growth Models

62) D
ID: CA4Z 4.5.2-3
Objective: (4.5) Use Logistic Growth Models

63) B
ID: CA4Z 4.5.1-3
Objective: (4.5) Model Exponential Growth and Decay

64) D
ID: CA4Z 4.5.1-2
Objective: (4.5) Model Exponential Growth and Decay

65) A
ID: CA4Z 3.2.7-4
Objective: (3.2) Understand the Relationship Between Degree and Turning Points

66) D
ID: CA4Z 3.2.5-12
Objective: (3.2) Identify Zeros and Their Multiplicities

67) B
ID: CA4Z 3.2.5-14
Objective: (3.2) Identify Zeros and Their Multiplicities

68) B
ID: CA4Z 3.3.4-10
Objective: (3.3) Use the Factor Theorem to Solve a Polynomial Equation

69) C
ID: CA4Z 3.3.1-15
Objective: (3.3) Use Long Division to Divide Polynomials

70) C
ID: CA4Z 3.3.3-3
Objective: (3.3) Evaluate a Polynomial Using the Remainder Theorem

71) A
ID: CA4Z 3.3.2-4
Objective: (3.3) Use Synthetic Division to Divide Polynomials

72) C
ID: CA4Z 3.4.4-9
Objective: (3.4) Use the Linear Factorization Theorem to Find Polynomials with Given Zeros

73) D
ID: CA4Z 3.4.2-3
Objective: (3.4) Find Zeros of a Polynomial Function

74) A
ID: CA4Z 3.4.3-7
Objective: (3.4) Solve Polynomial Equations

75) B
ID: CA4Z 3.4.2-8
Objective: (3.4) Find Zeros of a Polynomial Function

76) A
ID: CA4Z 3.5.5-2
Objective: (3.5) Use Transformations to Graph Rational Functions

77) D
ID: CA4Z 3.5.2-9
Objective: (3.5) Use Arrow Notation

78) B
ID: CA4Z 3.5.6-14
Objective: (3.5) Graph Rational Functions

79) A
ID: CA4Z 3.5.6-17
Objective: (3.5) Graph Rational Functions

80) B
ID: CA4Z 3.6.1-11
Objective: (3.6) Solve Polynomial Inequalities

81) C
ID: CA4Z 3.6.1-12
Objective: (3.6) Solve Polynomial Inequalities

82) B
ID: CA4Z 3.6.3-1
Objective: (3.6) Solve Problems Modeled by Polynomial or Rational Inequalities

83) B
ID: CA4Z 3.6.1-21
Objective: (3.6) Solve Polynomial Inequalities

84) A
ID: CA4Z 2.5.4-1
Objective: (2.5) Use Reflections to Graph Functions

85) D
ID: CA4Z 2.5.4-5
Objective: (2.5) Use Reflections to Graph Functions

86) C
ID: CA4Z 2.5.5-6
Objective: (2.5) Use Vertical Stretching and Shrinking to Graph Functions

87) C
ID: CA4Z 2.6.1-2
Objective: (2.6) Find the Domain of a Function

88) B
ID: CA4Z 2.6.4-3
Objective: (2.6) Determine Domains for Composite Functions

89) C
ID: CA4Z 2.6.5-3
Objective: (2.6) Write Functions as Compositions

90) A
ID: CA4Z 2.6.3-1
Objective: (2.6) Form Composite Functions

91) A
ID: CA4Z 2.7.3-6
Objective: (2.7) Use the Horizontal Line Test to Determine if a Function has an Inverse Function

92) D
ID: CA4Z 2.7.5-1
Objective: (2.7) Find the Inverse of a Function and Graph Both Functions on the Same Axes

93) A
ID: CA4Z 2.7.5-6
Objective: (2.7) Find the Inverse of a Function and Graph Both Functions on the Same Axes

94) B
ID: CA4Z 2.7.5-2
Objective: (2.7) Find the Inverse of a Function and Graph Both Functions on the Same Axes

95) C
ID: CA4Z 2.3.7-10
Objective: (2.3) Model Data with Linear Functions and Make Predictions

96) D
ID: CA4Z 2.3.2-5
Objective: (2.3) Write the Point-Slope Equation of a Line

97) D
ID: CA4Z 2.3.7-6
Objective: (2.3) Model Data with Linear Functions and Make Predictions

98) C
ID: CA4Z 2.2.3-9
Objective: (2.2) Identify Intervals on Which a Function Increases, Decreases, or is Constant

99) B
ID: CA4Z 2.2.6-7
Objective: (2.2) Graph Step Functions

100) C
ID: CA4Z 2.2.4-1
Objective: (2.2) Use Graphs to Locate Relative Maxima or Minima