Math 140 Final Exam Review Guide – Spring 2011

These are sample questions only. The actual questions on the final exam may vary.

Find the domain and range.

1) {(−1, −4), (−2, −3), (−2, 0), (7, 3), (23, 5)}

A) domain: {−1, 7, −2, 23}; range: {−4, −3, 3, 5}
B) domain: {−4, −3, 0, 3, 5}; range: {−1, 7, −2, 23}
C) domain: {−1, 7, −2, 23}; range: {−4, −3, 0, 3, 5}
D) domain: {−4, −3, 3, 5}; range: {−1, 7, −2, 23}

2) {(1, −2), (−3, −1), (−3, 0), (−2, 1), (6, 3)}

A) domain: {1, −2, −3, 6}; range: {−2, −1, 1, 3}
B) domain: {−2, −1, 0, 1, 3}; range: {1, −2, −3, 6}
C) domain: {−2, −1, 1, 3}; range: {1, −2, −3, 6}
D) domain: {1, −2, −3, 6}; range: {−2, −1, 0, 1, 3}

Decide whether the relation is a function.

3) {(−8, −9), (−8, 6), (−1, 8), (6, 6), (9, 3)}

A) not a function
B) function

Find the quotient and the remainder.

4) $8x^3 + 25x^2 - 19x + 36$ divided by $x + 4$

A) $x^2 + 7x + 8$; remainder 0
B) $8x^2 + 7x + 9$; remainder 0
C) $x^2 + 8x + 9$; remainder 0
D) $8x^2 - 7x + 9$; remainder 0

5) $5x^3 - 7x^2 + 7x - 8$ divided by $5x - 2$

A) $x^2 - x + 1$; remainder −6
B) $x^2 + x - 1$; remainder −6
C) $x^2 - x + 1$; remainder 10
D) $x^2 - x + 1$; remainder 6

6) $x^4 + 6x^2 + 8$ divided by $x^2 + 1$

A) $x^2 + 5x + \frac{3}{2}$; remainder 3
B) $x^2 + 5$; remainder 0
C) $x^2 + 5x + 1$; remainder 0
D) $x^2 + 5$; remainder 3

Perform the indicated operations and simplify the result. Leave the answer in factored form.

7) $\frac{x^2 - 14x + 40}{x^2 - 8x + 7} \cdot \frac{x^2 - 13x + 42}{x^2 - 13x + 36}$

A) $\frac{(x^2 - 14x + 40)(x^2 - 13x + 42)}{(x^2 - 8x + 7)(x^2 - 13x + 36)}$
B) $\frac{(x - 10)}{(x - 9)}$
C) $\frac{(x - 10)(x - 6)}{(x - 1)(x - 9)}$
D) $\frac{(x + 10)(x + 6)}{(x + 1)(x + 9)}$

Solve the equation by factoring.

8) $3x^2 + 14x - 5 = 0$

A) $\{\frac{1}{3}, 5\}$
B) $\{-\frac{1}{3}, -5\}$
C) $\{-\frac{1}{3}, 5\}$
D) $\{\frac{1}{3}, -5\}$

9) $7x - 27 = \frac{4}{x}$

A) $\{\frac{1}{27}, -\frac{1}{7}\}$ B) $\{-7, 4\}$ C) $\{-\frac{1}{7}, 7\}$ D) $\{-\frac{1}{7}, 4\}$

10) $\frac{x-8}{x} = \frac{63}{x+8}$

A) {64, 1} B) {8, -1} C) {64, -1} D) {8, 1}

For the given functions f and g, find the requested function and state its domain.

11) $f(x) = 4x - 2$; $g(x) = 2x - 5$

Find f - g.

A) $(f - g)(x) = 6x - 7$; $\{x \mid x \neq 1\}$ B) $(f - g)(x) = 2x - 7$; $\{x \mid x \neq \frac{7}{2}\}$

C) $(f - g)(x) = -2x - 3$; all real numbers D) $(f - g)(x) = 2x + 3$; all real numbers

12) $f(x) = 4x^3 + 1$; $g(x) = 4x^2 - 1$

Find f • g.

A) $(f \cdot g)(x) = 16x^5 - 4x^3 + 4x^2 - 1$; all real numbers

B) $(f \cdot g)(x) = 4x^3 + 4x^2 - 1$; all real numbers

C) $(f \cdot g)(x) = 16x^5 - 4x^3 + 4x^2 - 1$; $\{x \mid x \neq 0\}$

D) $(f \cdot g)(x) = 16x^6 - 4x^3 + 4x^2 - 1$; all real numbers

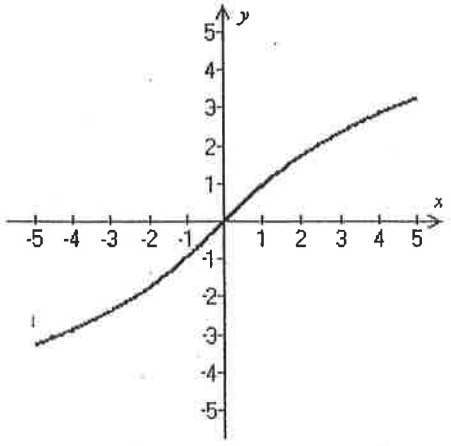
Solve the problem.

13) Find $(f - g)(4)$ when $f(x) = 3x^2 - 3$ and $g(x) = x + 3$.

A) 46 B) 44 C) 38 D) -49

Use the graph to find the intervals on which it is increasing, decreasing, or constant.

14)



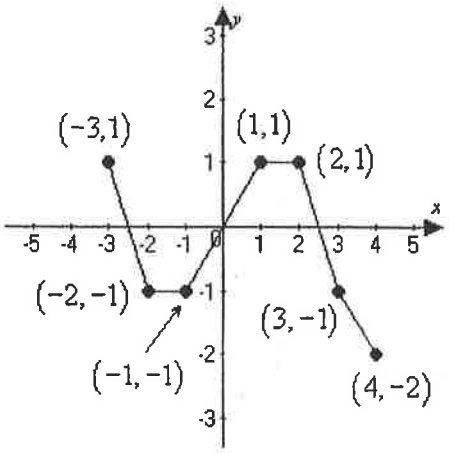
A) Increasing on $(-\infty, \infty)$

B) Decreasing on $(-\infty, 0)$; increasing on $(0, \infty)$

C) Decreasing on $(-\infty, \infty)$

D) Increasing on $(-\infty, 0)$; decreasing on $(0, \infty)$

15)



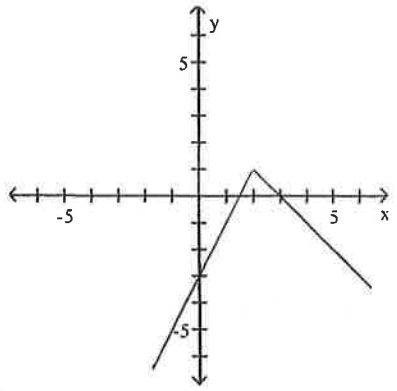
A) Decreasing on (-3, -2) and (2, 4); increasing on (-1, 1); constant on (-2, -1) and (1, 2)
B) Increasing on (-3, -2) and (2, 4); decreasing on (-1, 1); constant on (-2, -1) and (1, 2)
C) Decreasing on (-3, -1) and (1, 4); increasing on (-2, 1)
D) Decreasing on (-3, -2) and (2, 4); increasing on (-1, 1)

Graph the function.

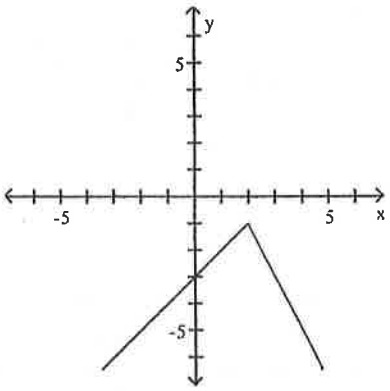
16)

$$f(x) = \begin{cases} -x + 3 & \text{if } x < 2 \\ 2x - 3 & \text{if } x \geq 2 \end{cases}$$

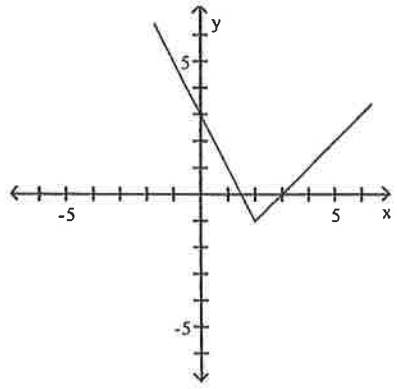
A)



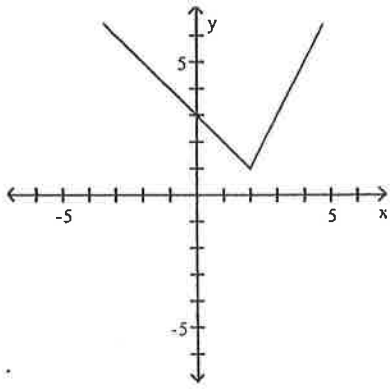
B)



C)



D)



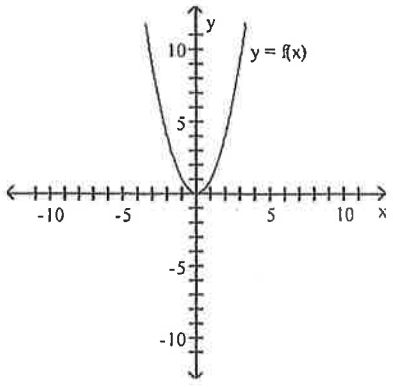
Solve the problem.

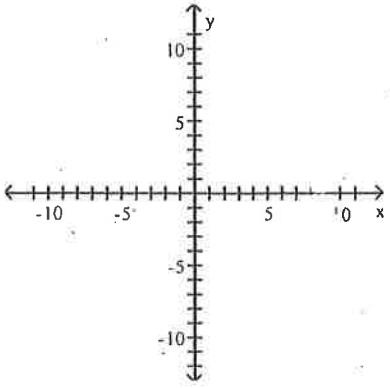
17) Suppose that the x-intercepts of the graph of $y = f(x)$ are 3 and 7. What are the x-intercepts of $y = f(x - 2)$?

A) 5 and 9 B) 1 and 5 C) 3 and 5 D) 6 and 14

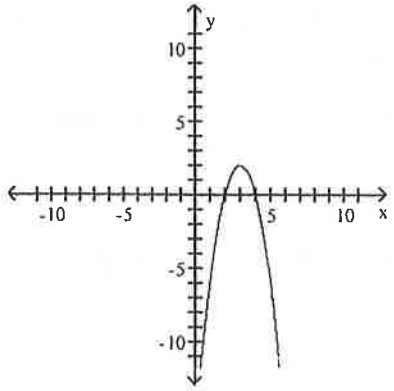
Use the accompanying graph of $y = f(x)$ to sketch the graph of the indicated equation.

18) $y = -2f(x + 3) + 2$

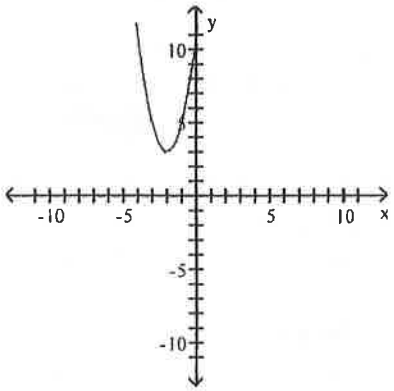




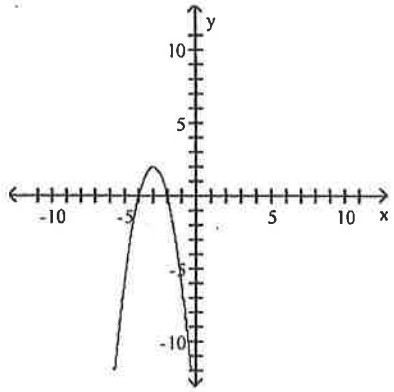
A)



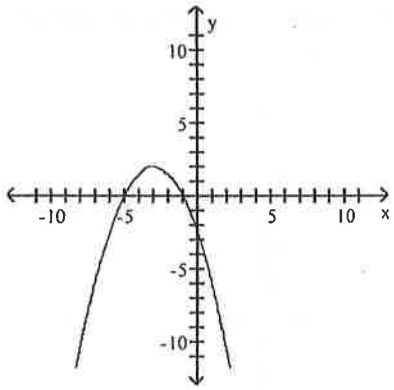
B)



C)



D)



Solve the problem.

19) Suppose that the x-intercepts of the graph of $y = f(x)$ are 6 and 3. What are the x-intercepts of $y = 2f(x)$?

A) 6 and 3 B) 18 and 6 C) 8 and 5 D) 4 and 1

Find the function.

20) Find the function that is finally graphed after the following transformations are applied to the graph of $y = |x|$. The graph is shifted right 3 units, stretched by a factor of 3, shifted vertically down 2 units, and finally reflected across the x-axis.

A) $y = -(3|x - 3| - 2)$ B) $y = 3|-x - 3| - 2$ C) $y = -(3|x + 3| - 2)$ D) $y = -3|x - 3| - 2$

Solve the problem.

21) A truck rental company rents a moving truck one day by charging \$27 plus \$0.11 per mile. Write a linear equation that relates the cost C, in dollars, of renting the truck to the number x of miles driven. What is the cost of renting the truck if the truck is driven 220 miles?

A) $C(x) = 27x + 0.11$; \$5940.11
(B) $C(x) = 0.11x + 27$; \$51.20
C) $C(x) = 0.11x - 27$; -\$2.80
D) $C(x) = 0.11x + 27$; \$29.42

22) If an object is dropped from a tower, then the velocity, V (in feet per second), of the object after t seconds can be obtained by multiplying t by 32 and adding 10 to the result. Find V as a linear function of t, and use this function to evaluate V(3.9), the velocity of the object at time $t = 3.9$ seconds.

A) V(3.9) = 136.1 feet per second
(B) V(3.9) = 134.8 feet per second
C) V(3.9) = 134.1 feet per second
D) V(3.9) = 132.8 feet per second

23) Marty's Tee Shirt & Jacket Company is to produce a new line of jackets with a embroidery of a Great Pyrenees dog on the front. There are fixed costs of $650 to set up for production, and variable costs of $48 per jacket. Write an equation that can be used to determine the total cost, C(x), encountered by Marty's Company in producing x jackets, and use the equation to find the total cost of producing 87 jackets.

A) $4818 (B) $4826 C) $4806 D) $4838

Find the vertex and axis of symmetry of the graph of the function.

24) $f(x) = x^2 + 4x + 3$

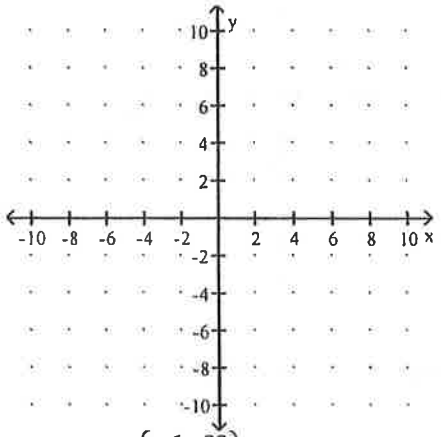
(A) (-2, -1); x = -2 B) (-2, 1); x = -2 C) (2, 1); x = 2 D) (2, -1); x = 2

25) $f(x) = 7x^2 + 14x + 1$

A) (-2, 15) ; x = -2 B) (2, 57) ; x = 2 C) (1, 22) ; x = 1 (D) (-1, -6) ; x = -1

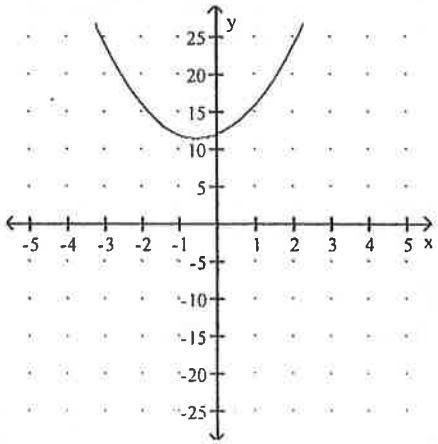
Graph the function using its vertex, axis of symmetry, and intercepts.

26) $f(x) = -2x^2 - 2x - 12$



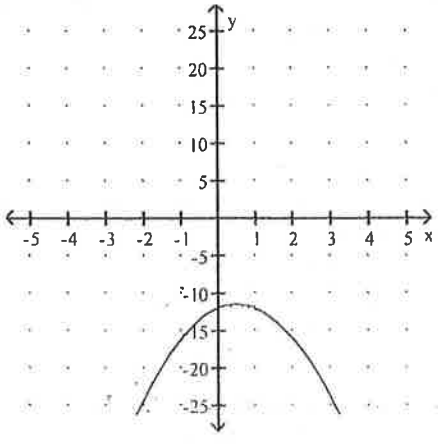
A) vertex $\left(-\frac{1}{2}, \frac{23}{2}\right)$

intercept (0, 12)

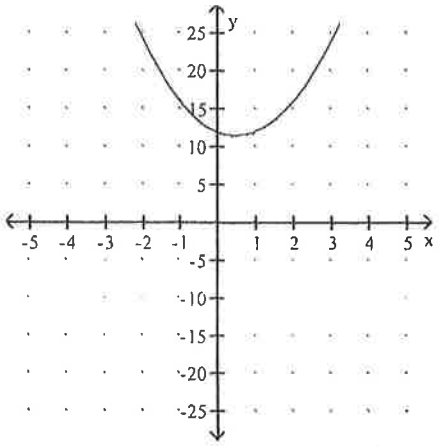


B) vertex $\left(\frac{1}{2}, -\frac{23}{2}\right)$

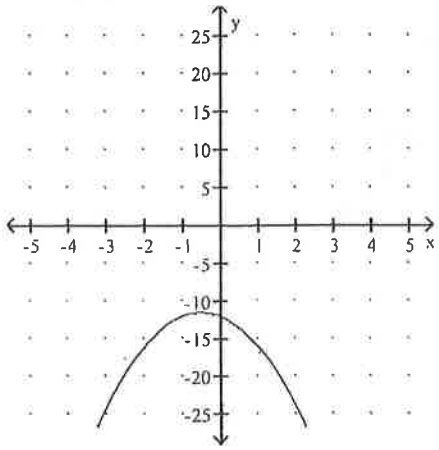
intercept (0, -12)



C) vertex $\left(\frac{1}{2}, \frac{23}{2}\right)$
intercept (0, 12)



D) vertex $\left(-\frac{1}{2}, -\frac{23}{2}\right)$
intercept (0, −12)



Find the domain of the rational function.

27) $G(x) = \frac{9x^2}{(x-2)(x+4)}$

A) $\{x \mid x \neq 2, x \neq -4, x \neq -9\}$
C) $\{x \mid x \neq 2, x \neq -4\}$
B) $\{x \mid x \neq -2, x \neq 4\}$
D) all real numbers

28) $G(x) = \frac{x+3}{x^2+1}$

A) $\{x \mid x \neq 0, x \neq -1\}$
C) $\{x \mid x \neq -1, x \neq 1, x \neq -3\}$
B) $\{x \mid x \neq -1, x \neq 1\}$
D) all real numbers

29) $F(x) = \frac{2x^2-4}{3x^2+6x-45}$.

A) $\{x \mid x \neq 3, x \neq -5\}$
C) $\{x \mid x \neq -3, x \neq 5\}$
B) $\{x \mid x \neq 3, x \neq -3, x \neq -5\}$
D) all real numbers

Find the vertical asymptotes of the rational function.

30) $G(x) = \frac{x}{x^3-125}$

A) $x = 5$
B) $x = -5$
C) $x = 25$
D) $x = -5, x = 5$

Give the equation of the oblique asymptote, if any, of the function.

31) $G(x) = \frac{2x^3+11x^2+5x-1}{x^2+6x+5}$.

A) $y = 2x - 1$
B) $y = 2x$
C) $y = 0$
D) $y = 2x + 1$

32) $Q(x) = \frac{-15x^3-16x^2-24x+7}{5x+2}$.

A) $y = 0$
B) $y = -3x - 4$
C) $y = -3x^2 - 2x - 4$
D) none

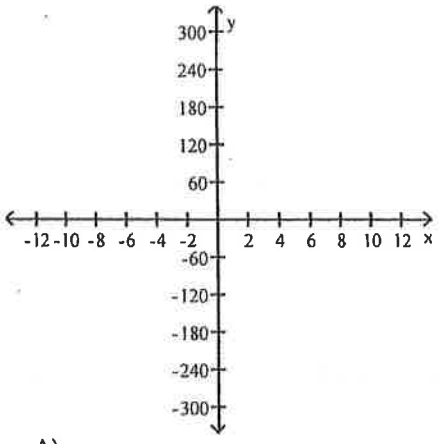
Find the vertical asymptotes of the rational function.

33) $f(x) = \dfrac{-2x(x+2)}{4x^2 - 5x - 9}$

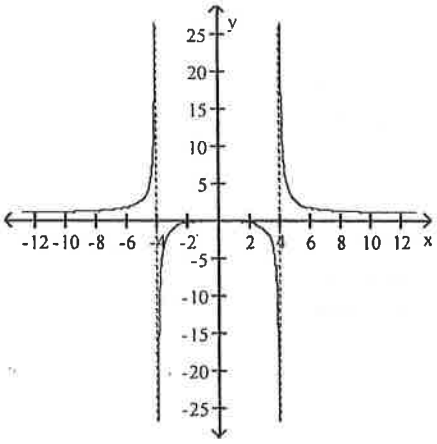
A) $x = \dfrac{4}{9}, x = -1$ B) $x = -\dfrac{4}{9}, x = 1$ C) $x = -\dfrac{9}{4}, x = 1$ D) $x = \dfrac{9}{4}, x = -1$

Graph the function.

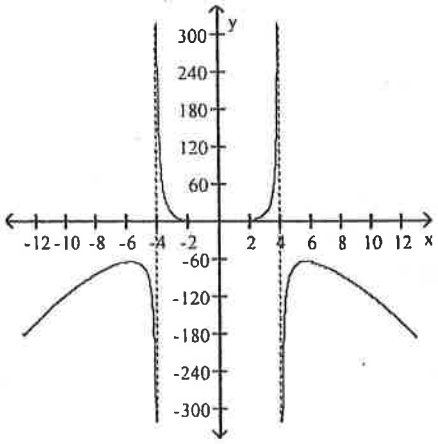
34) $f(x) = \dfrac{x^4 - 1}{x^2 - 16}$



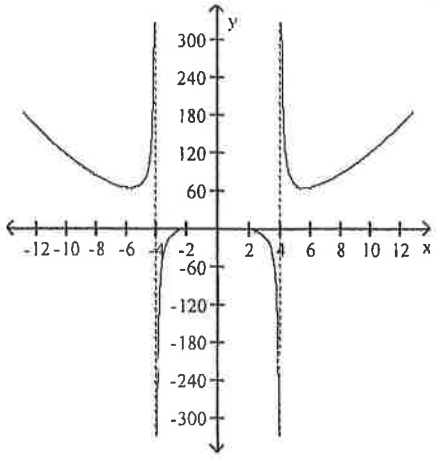
A)



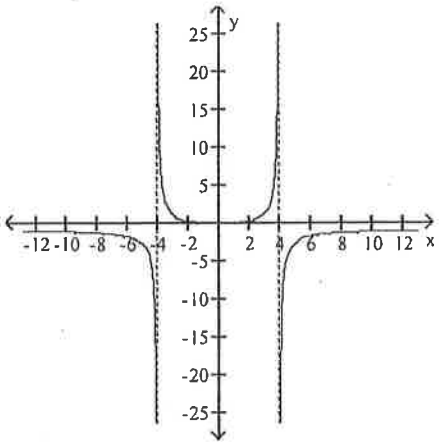
B)



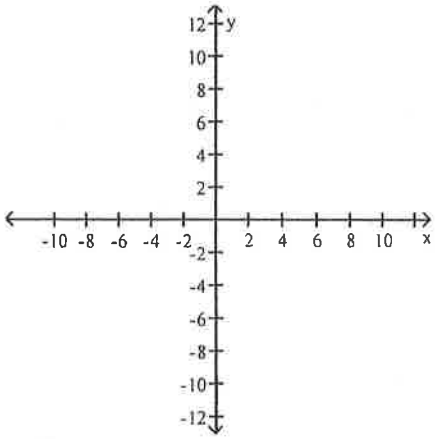
C)



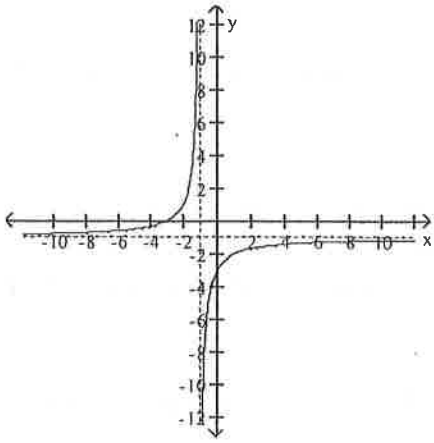
D)



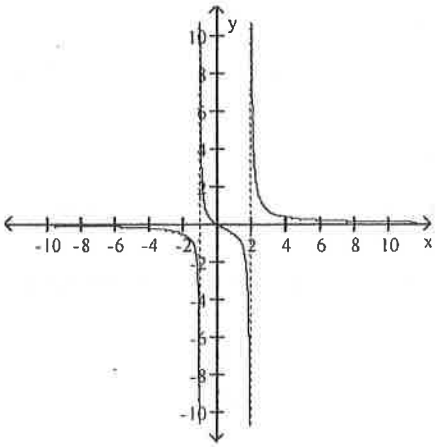
35) $f(x) = \dfrac{x^2 + x - 6}{x^2 - x - 2}$



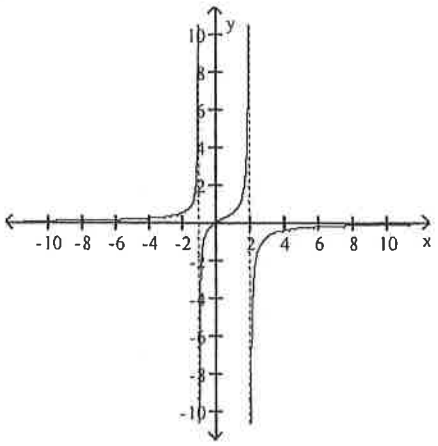
A)



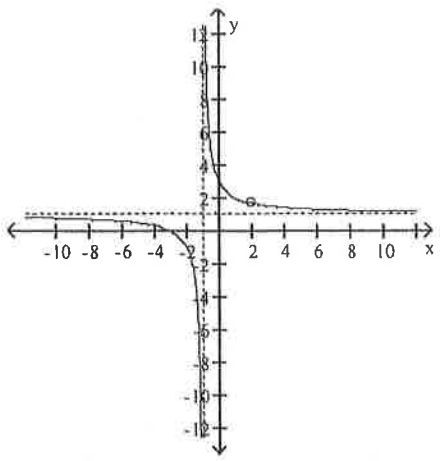
B)



C)



D)



Solve the inequality. Express the solution using interval notation.

36) $x^3 + 4x^2 - 45x > 0$

A) (−5, 0) or (9, ∞) B) (−9, 0) or (5, ∞) C) (−9, ∞) D) (−∞,−9) or (0, 5)

37) $x(x + 3)(5 - x) \geq 0$

A) [−3, 0] or [5, ∞) B) [−3, 5] C) (−∞, −3] or [0, 5] D) [0, 5]

38) $x^3 \leq 3x^2$

A) (−∞, 3] B) [3, ∞) C) (−∞, 0] or [3, ∞) D) (0, 3]

39) $\frac{x + 18}{x + 2} < 8$

A) $(-\infty, -2)$ or $(2, \infty)$ B) $\left(-\infty, \frac{2}{7}\right)$ or $(2, \infty)$ C) $(-\infty, -2)$ or $\left(\frac{2}{7}, \infty\right)$ D) $\left(-2, \frac{2}{7}\right)$

40) $\frac{8}{x - 3} > \frac{6}{x + 1}$

A) (−∞, −13) or (3, ∞) B) (−13, −1) or (3, ∞) C) (−13, −1) or (−1, 3) D) (−∞, −13) or (−1, 3)

41) $\frac{8x - 4}{x + 9} \leq 7$

A) (−9, 11] B) (−9, 67) C) (−9, 67] D) (−9, 11)

Use the Rational Zeros Theorem to find all the real zeros of the polynomial function. Use the zeros to factor f over the real numbers.

42) $f(x) = 4x^3 - 7x^2 - 5x + 6$

A) $-1, \frac{3}{4}, 2$; $f(x) = (4x - 3)(x - 2)(x + 1)$ B) $1, \frac{4}{-}, -2$; $f(x) = (4x - 3)(x - 1)(x + 2)$

C) $-1, \frac{4}{3}, -2$; $f(x) = (4x - 3)(x - 2)(x + 1)$ D) $-\frac{3}{4}, 1$; $f(x) = (4x - 3)(x - 1)(x + 2)$

43) $f(x) = 3x^4 - 8x^3 + 17x^2 - 32x + 20$

A) $1, \frac{5}{3}$; $f(x) = (x - 1)(3x - 5)(x^2 + 4)$

B) $4, \frac{5}{3}$; $f(x) = (x - 4)(3x - 5)(x^2 + 1)$

C) $-4, -1, 1, -\frac{5}{3}$; $f(x) = (x - 1)(3x + 5)(x + 1)(x + 4)$

D) $-4, -1, 1, \frac{5}{3}$; $f(x) = (x - 1)(3x - 5)(x + 1)(x + 4)$

Solve the equation in the real number system.

44) $x^3 + 6x^2 + 11x + 6 = 0$

A) {1, 2}

B) {-2, -1}

C) {-2, -1, -3}

D) {3, 1, 2}

45) $2x^3 - 9x^2 + 7x + 6 = 0$

A) $\left\{\frac{3}{2}, -1, 2\right\}$

B) $\left\{\frac{1}{2}, 2, -3\right\}$

C) $\left\{-\frac{1}{2}, 2, 3\right\}$

D) $\left\{-\frac{3}{2}, -1, -2\right\}$

Evaluate the expression using the values given in the table.

46) $(g \circ f)(1)$

x	1	6	9	12
f(x)	-4	9	0	13

x	-5	-4	1	3
g(x)	1	-8	6	9

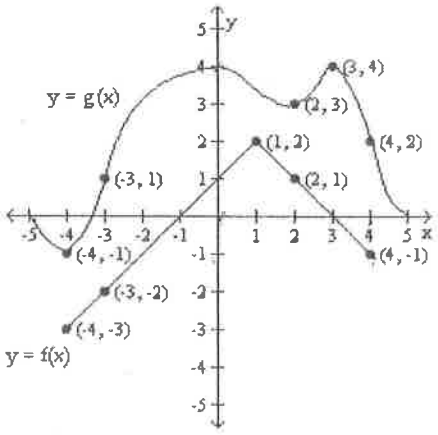
A) 9

B) -8

C) 6

D) -4

47)



$f(g(0))$

A) -1

B) 0

C) 4

D) 2

For the given functions f and g, find the requested composite function value.

48) $f(x) = 16x^2 - 10x$, $g(x) = 14x - 10$; Find $(f \circ g)(2)$.

A) 4398

B) 792

C) 606

D) 5004

For the given functions f and g, find the requested composite function.

49) $f(x) = x^2 + 9$, $g(x) = x^2 - 5$; Find $(f \circ g)(x)$.

A) $x^4 + 76$

B) $x^4 - 10x^2 + 34$

C) $x^4 + 34$

D) $x^4 + 18x^2 + 76$

Decide whether the composite functions, $f \circ g$ and $g \circ f$, are equal to x.

50) $f(x) = \sqrt{x+1}$, $g(x) = x^2$

A) No, no B) Yes, no C) No, yes D) Yes, yes

Find functions f and g so that $f \circ g = H$.

51) $H(x) = \dfrac{1}{x^2 - 6}$

A) $f(x) = x^2 - 6$; $g(x) = \dfrac{1}{x}$

B) $f(x) = \dfrac{1}{x}$; $g(x) = \dfrac{1}{x^2} - 9$

C) $f(x) = \dfrac{1}{x^2} - 9$; $g(x) = \dfrac{1}{x}$

D) $f(x) = \dfrac{1}{x}$, $g(x) = x^2 - 6$

52) $H(x) = \dfrac{8}{\sqrt{4x+6}}$

A) $f(x) = \sqrt{4x+6}$; $g(x) = 8$

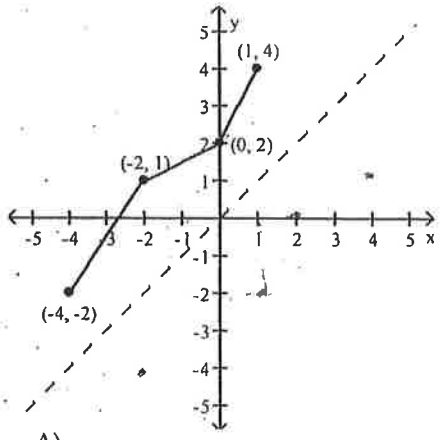
B) $f(x) = 8$; $g(x) = \sqrt{4+6}$

C) $f(x) = \dfrac{8}{\sqrt{x}}$; $g(x) = 4x + 6$

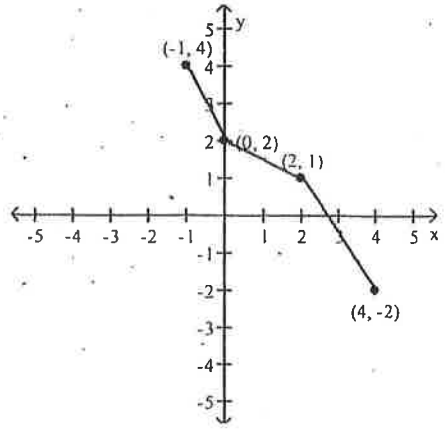
D) $f(x) = \dfrac{8}{x}$; $g(x) = 4x + 6$

The graph of a one-to-one function is given. Draw the graph of the inverse function f^{-1}. For convenience, the graph of $y = x$ is also give.

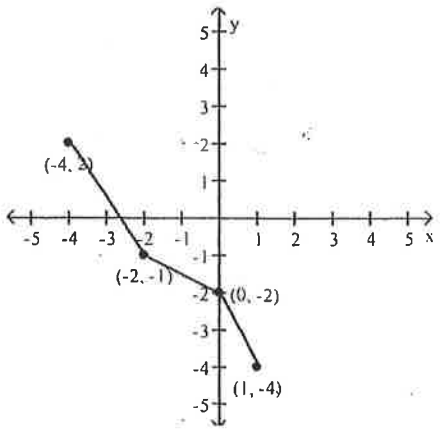
53)



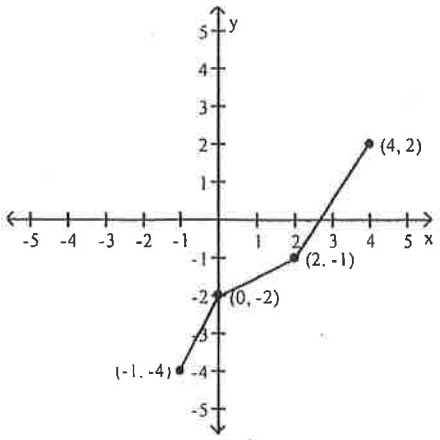
A)



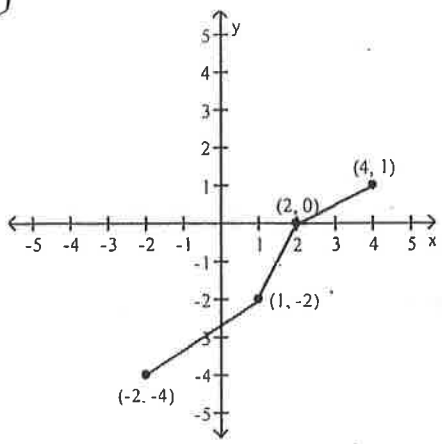
B)



C)



D)



Decide whether or not the functions are inverses of each other.

54) $f(x) = \frac{3}{x+7}$, $g(x) = \frac{7x+3}{x}$

A) Yes; exclude the value {-7}.
B) Yes; no values need to be excluded.
C) No

The function f is one-to-one. Find its inverse.

55) $f(x) = x^2 - 4, x \geq 0$

A) $f^{-1}(x) = \sqrt{x} + 4, x < 0$
B) $f^{-1}(x) = \sqrt{x+4}, x \geq -4$
C) $f^{-1}(x) = \sqrt{x} + 4, x \geq 0$
D) $f^{-1}(x) = \sqrt{x-4}, x \geq 4$

56) $f(x) = \frac{-8x+5}{-5x+3}$

A) $f^{-1}(x) = \frac{-5x+8}{-3x+5}$
B) $f^{-1}(x) = \frac{-3x+5}{-5x+8}$
C) $f^{-1}(x) = \frac{-8x+5}{-5x+3}$
D) $f^{-1}(x) = \frac{-8x-8}{-5x+3}$

Solve the problem.

57) If $8^{-x} = \frac{1}{4}$, what does 64^x equal?

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

Change the exponential expression to an equivalent expression involving a logarithm.

58) $3^{-2} = \frac{1}{9}$.

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

Change the logarithmic expression to an equivalent expression involving an exponent.

59) $\log_b 49 = \frac{2}{3}$

A) $49^{2/3} = b$ B) $b^{3/2} = 49$ C) $b^{2/3} = 49$ D) $\left(\frac{2}{3}\right)^b = 49$

Find the exact value of the logarithmic expression.

60) $\log_8 \frac{1}{64}$

A) 8 B) 2 C) -8 D) -2

61) $\log_4 \frac{1}{64}$

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

62) $\log_7 \sqrt{7}$

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

Solve the equation.

63) $e^{3x} = 6$

A) $\left\{\frac{\ln 6}{3}\right\}$ B) $\{2e\}$ C) $\left\{\frac{\ln 3}{6}\right\}$ D) $\{3 \ln 6\}$

64) $e^{x+3} = 5$

A) $\{e^5 + 3\}$ B) $\{\ln 8\}$ C) $\{e^{15}\}$ D) $\{\ln 5 - 3\}$

Use the properties of logarithms to find the exact value of the expression. Do not use a calculator.

65) $\log_6 30 - \log_6 5$

A) 1 B) 6 C) 5 D) 30

Write as the sum and/or difference of logarithms. Express powers as factors.

66) $\log_5 \left(\frac{\sqrt{x}}{25}\right)$

A) $\log_5 x - 2$ B) $10 - \frac{1}{2} \log_5 x$ C) $-2 \log_5 x$ D) $\frac{1}{2} \log_5 x - 2$

67) $\log_b \sqrt[3]{\frac{x^5 y^8}{z^2}}$

Express as a single logarithm.

68) $11 \ln (x - 2) - 10 \ln x$

A) $\ln x^{10}(x - 2)^{11}$ B) $\ln \frac{(x-2)^{11}}{x^{10}}$ C) $\ln \frac{11(x-2)}{10x}$ D) $\ln 110x(x - 2)$

69) $4 \log_6 4 + \frac{1}{6} \log_6 (x - 2) - \frac{1}{2} \log_6 x$

A) $\log_6 \frac{256x - 2}{12x}$ B) $\log_6 \frac{256\sqrt[6]{x - 2}}{\sqrt{x}}$ C) $\log_6 \left(\frac{1}{3} \sqrt{\frac{x - 2}{x}} \right)$ D) $\log_6 \sqrt{\frac{4x - 8}{12x}}$

Use the Change-of-Base Formula and a calculator to evaluate the logarithm. Round your answer to three decimal places.

70) $\log_8 0.690$

A) 11.594 B) -5.604 C) -0.178 D) -0.161

Use the Change-of-Base Formula and a calculator to evaluate the logarithm. Round your answer to two decimal places.

71) $\log_{4.2} 3.4$

A) 0.53 B) 0.81 C) 0.85 D) 1.17

Solve the equation.

72) $\log_4 (x - 2) = 3$

A) {66} B) {83} C) {62} D) {79}

73) $\log (x + 5) = \log (4x - 4)$

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

74) $\log_2 (3x - 2) - \log_2 (x - 5) = 4$

A) $\left\{ \frac{38}{5} \right\}$ B) $\left\{ \frac{3}{13} \right\}$ C) {18} D) {6}

75) $\log_2 (x + 5) = 1 + \log_2 (x + 1)$

A) {3} B) {- 4} C) {- 3} D) {4}

Solve the problem.

76) The function $f(x) = 1 + 1.6 \ln (x + 1)$ models the average number of free-throws a basketball player can make consecutively during practice as a function of time, where x is the number of consecutive days the basketball player has practiced for two hours. After how many days of practice can the basketball player make an average of 5 consecutive free throws?

A) 13 days B) 11 days C) 42 days D) 44 days

77) The pH of a solution ranges from 0 to 14. An acid has a pH less than 7. Pure water is neutral and has a pH of 7. The pH of a solution is given by $pH = - \log x$ where x represents the concentration of the hydrogen ions in the solution in moles per liter. Find the hydrogen ion concentration if the pH = 1.4.

A) 2.51×10^{-2} B) 3.98×10^{-2} C) 2.51×10^{-1} D) 3.98×10^{-1}

Solve the equation.

78) $2^{(1 + 2x)} = 8$

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

79) $2^{(7-3x)} = \frac{1}{4}$

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

80) $3 \cdot 5^{2t-1} = 75$

A) $\left\{\frac{1}{2}\right\}$ B) $\left\{\frac{13}{10}\right\}$ C) {3} D) $\left\{\frac{3}{2}\right\}$

Solve the equation. Express irrational answers in exact form and as a decimal rounded to 3 decimal places.

81) $\left(\frac{9}{4}\right)^x = 2^{1-x}$

A) $\frac{\ln\left(\frac{9}{4}\right) + \ln 2}{\ln 2} \approx 2.170$ B) $\frac{\ln 2}{\ln\left(\frac{9}{4}\right) + \ln 2} \approx 0.461$

C) $\ln\left(\frac{9}{4}\right) - \ln 2 \approx 0.118$ D) $\frac{\ln 18}{\ln 8} \approx 1.390$

Solve the problem.

82) Find out how long it takes a $3200 investment to double if it is invested at 8% compounded semiannually. Round to the nearest tenth of a year. Use the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$.

A) 8.6 yr B) 9.2 yr C) 8.8 yr D) 9 yr

83) The population of a particular country was 27 million in 1983; in 1991, it was 37 million. The exponential growth function $A = 27e^{kt}$ describes the population of this country t years after 1983. Use the fact that 8 years after 1983 the population increased by 10 million to find k to three decimal places.

A) 0.288 B) 0.039 C) 0.049 D) 0.863

Solve the system of equations using matrices (row operations). If the system has no solution, say that it is inconsistent.

84)
$$\begin{cases} 3x - 2y = 6 \\ x + y = \frac{1}{4} \end{cases}$$

A) $x = \frac{13}{2}, y = -\frac{25}{4}; \left(\frac{13}{2}, -\frac{25}{4}\right)$ B) $x = \frac{13}{10}, y = -\frac{21}{20}; \left(\frac{13}{10}, -\frac{21}{20}\right)$

C) $x = \frac{11}{10}, y = -\frac{17}{20}; \left(\frac{11}{10}, -\frac{17}{20}\right)$ D) inconsistent

85)

$$\begin{cases} 3x + 8y - z = 79 \\ x - 8y - 8z = -85 \\ 5x + y + z = 16 \end{cases}$$

A) x = 3, y = 2, z = 9; (3, 2, 9)

B) x = -3, y = 9, z = 6; (-3, 9, 6)

C) x = 3, y = 9, z = 2; (3, 9, 2)

D) inconsistent

86)

$$\begin{cases} 3x - 2y + z = -7 \\ x + y - 2z = 12 \\ 3x + y - z = 10 \end{cases}$$

A) x = 2, y = 3, z = -7; (2, 3, -7)

B) x = 1, y = -3, z = -16; (1, -3, -16)

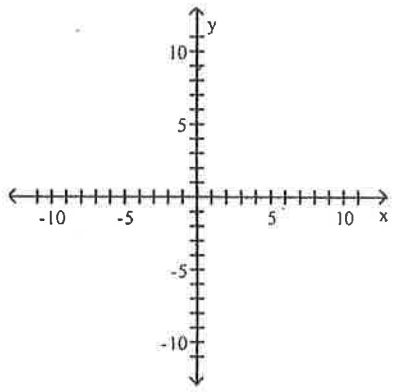
C) x = 1, y = 3, z = -4; (1, 3, -4)

D) $x = 5, y = \frac{13}{2}, z = -3; \left(5, \frac{13}{2}, -3\right)$

Graph the equations of the system. Then solve the system to find the points of intersection.

87)

$$\begin{cases} x^2 + y^2 = 9 \\ y = x^2 - 3 \end{cases}$$



Solve the system of equations using substitution.

88)

$$\begin{cases} x^2 + y^2 = 4 \\ x + y = 2 \end{cases}$$

A) x = 0, y = -2; x = -2, y = 0
or (0, -2), (-2, 0)

B) x = 0, y = 0; x = 2, y = -2
or (0, 0), (2, -2)

C) x = 0, y = 2; x = 2, y = 0
or (0, 2), (2, 0)

D) x = 2, y = -2; x = -2, y = -2
or (2,-2), (-2, -2)

89)

$$\begin{cases} y = 6x^2 - 5x \\ y = 2x + 3 \end{cases}$$

A) $x = \frac{1}{6}, y = \frac{10}{3}$; $x = 1, y = 5$

or $\left(\frac{1}{6}, \frac{10}{3}\right), (1, 5)$

B) $x = \frac{1}{3}, y = \frac{11}{3}$; $x = -\frac{3}{2}, y = 0$

or $\left(\frac{1}{3}, \frac{11}{3}\right), \left(-\frac{3}{2}, 0\right)$

C) $x = -\frac{1}{2}, y = 2$; $x = 1, y = 5$

or $\left(-\frac{1}{2}, 2\right), (1, 5)$

D) $x = \frac{3}{2}, y = 6$; $x = -\frac{1}{3}, y = -\frac{7}{3}$

or $\left(\frac{3}{2}, 6\right), \left(-\frac{1}{3}, -\frac{7}{3}\right)$

Solve using elimination.

90)

$$\begin{cases} 3x^2 - 3y^2 = 48 \\ 2x^2 + 2y^2 = 68 \end{cases}$$

A) $x = 5, y = -3$; $x = 5, y = 3$ or $(5, -3), (5, 3)$

B) $x = 5, y = 3$; $x = -5, y = 3$; $x = 5, y = -3$; $x = -5, y = -3$
or $(5, 3), (-5, 3), (5, -3), (-5, -3)$

C) $x = 5, y = 3$; $x = 3, y = 5$; $x = -5, y = -3$; $x = -3, y = -5$
or $(5, 3), (3, 5), (-5, -3), (-3, -5)$

D) $x = -5, y = -3$; $x = -3, y = -5$ or $(-5, -3), (-3, -5)$

91)

$$\begin{cases} x^2 + y^2 = 64 \\ \frac{x^2}{64} + \frac{y^2}{9} = 1 \end{cases}$$

A) $x = 0, y = -3$; $x = 0, y = 3$ or $(0, -3), (0, 3)$

B) $x = -8, y = 0$; $x = 8, y = 0$ or $(-8, 0), (8, 0)$

C) $x = 0, y = -8$; $x = 0, y = 8$ or $(0, -8), (0, 8)$

D) No real solution exists.

92)

$$\begin{cases} 2x^2 + y^2 = 17 \\ 3x^2 - 2y^2 = -6 \end{cases}$$

A) $x = 2, y = -3$; $x = -2, y = 3$ or $(2, -3), (-2, 3)$

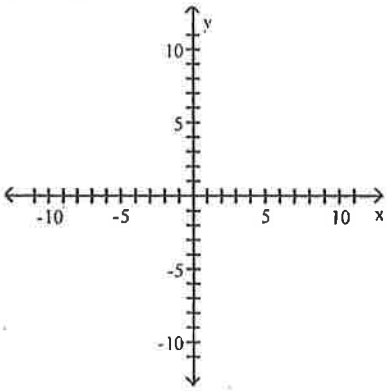
B) $x = 1, y = 3$; $x = 1, y = -3$; $x = -1, y = 3$; $x = -1, y = -3$
or $(1, 3), (1, -3), (-2, 3), (-2, -3)$

C) $x = 1, y = 3$; $x = -1, y = -3$ or $(1, 3), (-1, -3)$

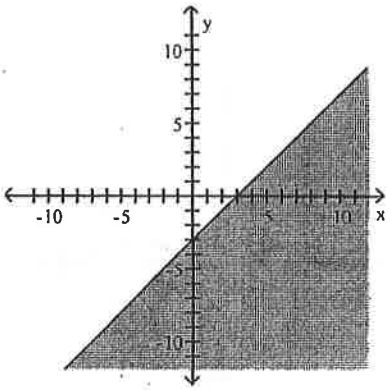
D) $x = 2, y = 3$; $x = 2, y = -3$; $x = -2, y = 3$; $x = -2, y = -3$
or $(2, 3), (2, -3), (-2, 3), (-2, -3)$

Graph the inequality.

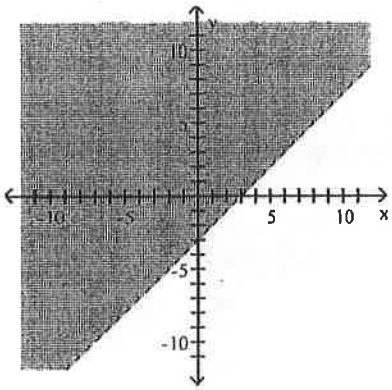
93) $y + 3 < x$



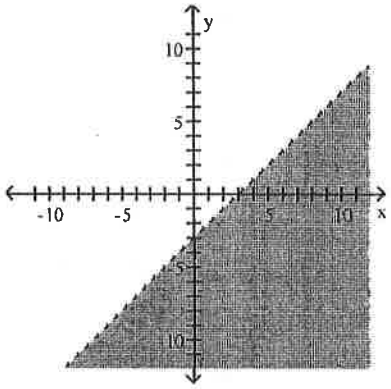
A)



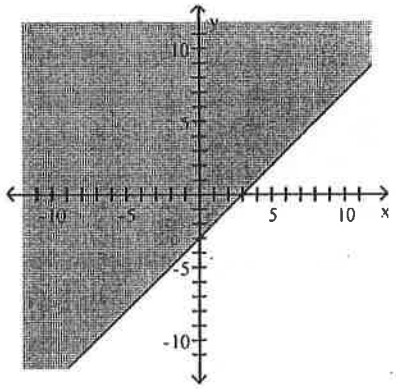
B)



C)



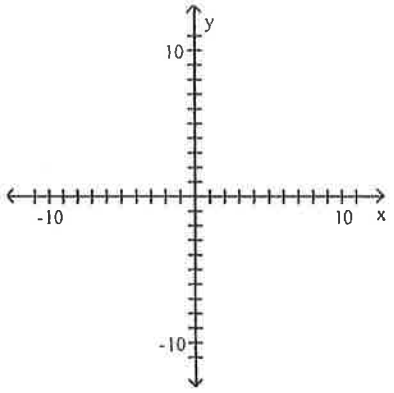
D)



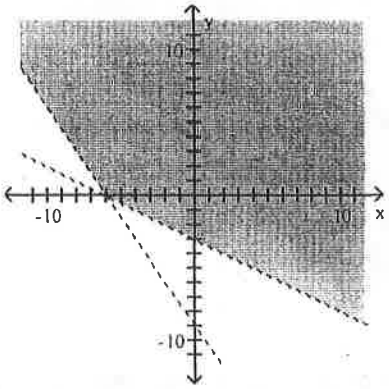
Graph the solution set of the system of inequalities or indicate that the system has no solution.

94)

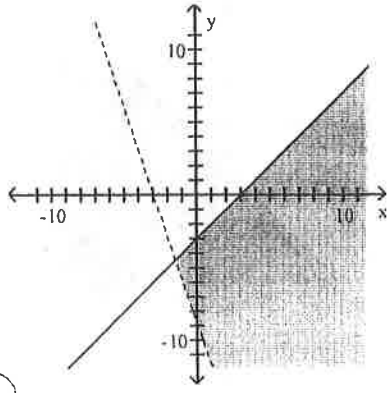
$$\begin{cases} -x + 2y \leq -6 \\ 3x + 2y > -18 \end{cases}$$



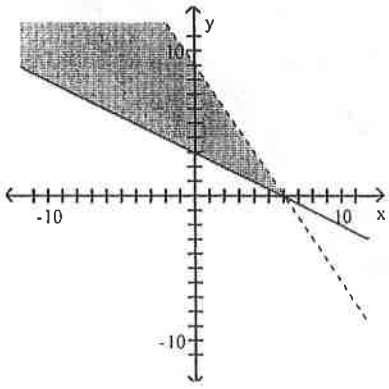
A)



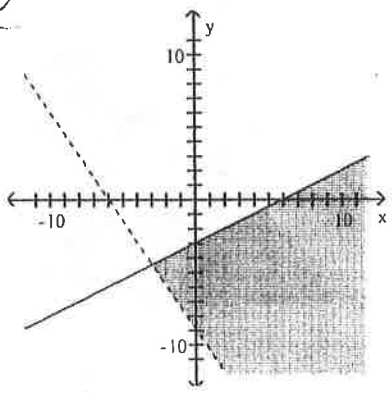
B)



C)



D)



95) $\begin{cases} 3x - y \le -9 \\ x + 2y \ge -4 \end{cases}$

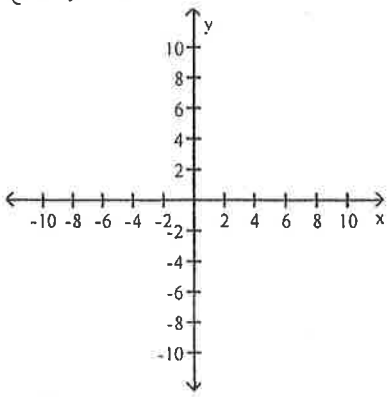
$-y \le -3y - 9 \rightarrow$ ① $y \ge 3y + 9$

② $2y \ge -x - 4$

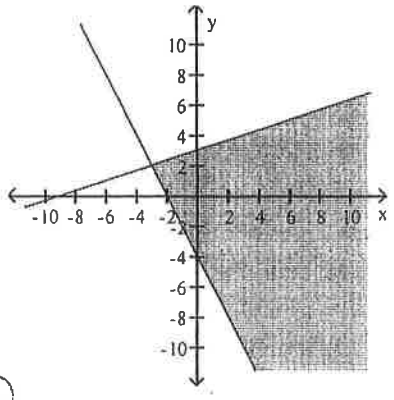
$y \ge -\frac{1}{2}x - 2$

$-y \le -3x - 9$

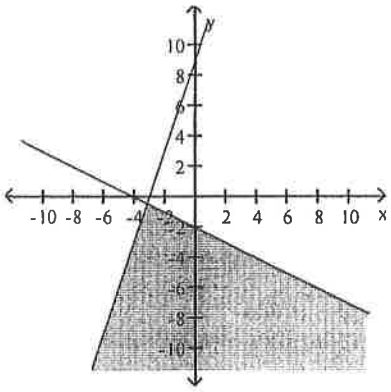
y



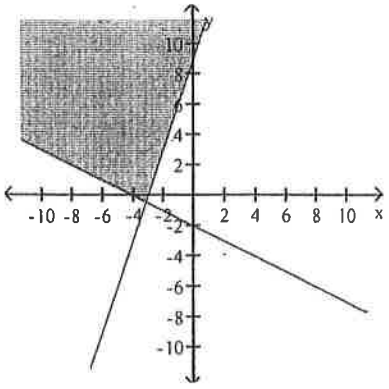
A)



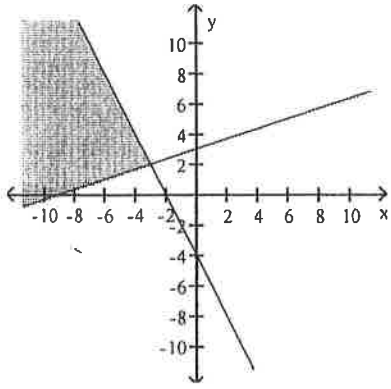
B)



C)



D)

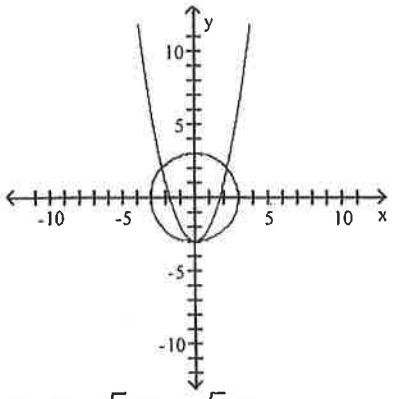


Answer Key
Testname: MATH 140 REVIEW 4.12.11

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

51) D
52) C
53) D
54) C
55) B
56) B
57) A
58) A
59) C
60) D
61) C
62) B
63) A
64) D
65) A
66) D
67) $\frac{5}{3}\log_b x + \frac{8}{3}\log_b y - \frac{2}{3}\log_b z$
68) B
69) B
70) C
71) C
72) A
73) C
74) D
75) A
76) B
77) B
78) B
79) A
80) D
81) B
82) C
83) B
84) B
85) C
86) C

87)



$(0, -3), (\sqrt{5}, 2), (-\sqrt{5}, 2)$

88) C
89) D
90) B
91) B
92) D
93) C
94) D
95) C