MAC 1105
Final Review

Simplify the rational expression. Find all numbers that must be excluded from the domain of the simplified rational expression.

1) $\frac{8x^2 - 49x + 6}{x - 6}$

A) $\frac{1}{x - 6}, x \neq 6$

B) $8x - 1, x \neq 6$

C) $8x^2 - 50$, no restrictions on x

D) $\frac{8x^2 - 49x + 6}{x - 6}, x \neq 6$

Divide.

2) $\frac{(x + 3)^2}{x - 3} \div \frac{x^2 - 9}{3x - 9}$

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

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

C) $\frac{6(x^2 + 9)}{x^2 - 9}$

D) $\frac{3(x + 3)}{x - 3}$

Simplify the complex rational expression.

3) $\frac{4 + \frac{2}{x}}{\frac{x}{4} + \frac{1}{8}}$

A) 1

B) $\frac{16}{x}$

C) $\frac{x}{16}$

D) 16

Solve the equation.

4) $\frac{2}{y + 5} - \frac{8}{y - 5} = \frac{4}{y^2 - 25}$

A) {54}

B) {9}

C) $\{\sqrt{37}\}$

D) {-9}

Perform the indicated operations and write the result in standard form.

5) $\sqrt{-5} - \sqrt{-121}$

A) $i(\sqrt{5} + 11)$

B) $\sqrt{5}i - 11$

C) $\sqrt{5i} - 11i$

D) $i(\sqrt{5} - 11)$

Find the product and write the result in standard form.

6) $(3 + 8i)(3 - 8i)$

A) 73

B) $9 - 64i$

C) -55

D) $9 - 64i^2$

Divide and express the result in standard form.

7) $\frac{2}{3 + i}$

A) $\frac{3}{4} - \frac{1}{4}i$

B) $\frac{3}{4} + \frac{1}{4}i$

C) $\frac{3}{5} + \frac{1}{5}i$

D) $\frac{3}{5} - \frac{1}{5}i$

Solve the equation by factoring.

8) $25x^2 + 30x + 8 = 0$

A) $\left\{-\frac{4}{25}, -\frac{1}{4}\right\}$ B) $\left\{\frac{4}{5}, -\frac{2}{5}\right\}$ C) $\left\{\frac{4}{5}, \frac{2}{5}\right\}$ D) $\left\{-\frac{4}{5}, -\frac{2}{5}\right\}$

Solve the equation by the square root property.

9) $(x - 5)^2 = -4$

A) $\{5i \pm 2\}$ B) $\{5 \pm 2i\}$ C) $\{-5 \pm 2i\}$ D) $\left\{\pm\frac{2i}{5}\right\}$

Solve the equation by completing the square.

10) $x^2 + 8x - 3 = 0$

A) $\{-4 - \sqrt{19}, -4 + \sqrt{19}\}$ B) $\{-4 - 1\sqrt{19}, -4 + 1\sqrt{19}\}$

C) $\{-1 - \sqrt{19}, -1 + \sqrt{19}\}$ D) $\{4 + \sqrt{19}\}$

Solve the equation using the quadratic formula.

11) $4x^2 + x - 4 = 0$

A) $\left\{\frac{1 - \sqrt{65}}{8}, \frac{1 + \sqrt{65}}{8}\right\}$ B) $\left\{\frac{-1 - \sqrt{65}}{8}, \frac{-1 + \sqrt{65}}{8}\right\}$

C) $\left\{\frac{-1 - \sqrt{65}}{2}, \frac{-1 + \sqrt{65}}{2}\right\}$ D) $\varnothing$

Compute the discriminant. Then determine the number and type of solutions for the given equation.

12) $x^2 + 6x - 7 = 0$

A) 0; one real solution

B) -8; two complex imaginary solutions

C) 64; two unequal real solutions

Solve the equation,.

13) $x - \sqrt{3x - 2} = 4$

A) $\{-1\}$ B) $\{1, 2\}$ C) $\{9\}$ D) $\{2, 9\}$

Solve the equation.

14) $x^4 - 40x^2 + 144 = 0$

A) $\{-2, 2, -6, 6\}$ B) $\{2, 6\}$ C) $\{-2i, 2i, -6i, 6i\}$ D) $\{4, 36\}$

Solve the inequality.

15) $|5x + 4| < 4$

A) $\left(-\infty, -\frac{8}{5}\right) \cup (0, \infty)$ B) $\left(-\infty, -\frac{8}{5}\right)$ C) $\left(-\frac{8}{5}, 0\right)$ D) $(-\infty, 5)$

16) $|4x - 2| \geq 8$

A) $\left(-\infty, -\frac{5}{2}\right] \cup [8, \infty)$ B) $\left(-\infty, -\frac{3}{2}\right] \cup \left[\frac{5}{2}, \infty\right)$ C) $\left[-\frac{3}{2}, \frac{5}{2}\right]$ D) $[\frac{5}{2}, \infty)$

Determine whether the relation is a function.

17) {(-8, -9), (-8, 9), (1, 3), (3, 5), (10, -9)}

A) Not a function

B) Function

Determine whether the equation defines y as a function of x.

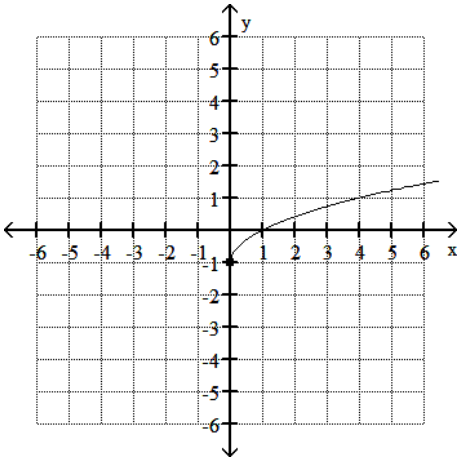
18) $x^2 + y = 16$

A) y is a function of x

B) y is not a function of x

Use the graph to determine the function's domain and range.

19)




A) domain: [0, ∞)
range: (-∞, ∞)

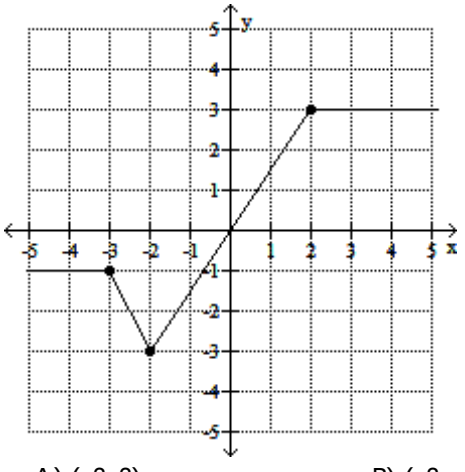
B) domain: (-∞, ∞)
range: [-1, ∞)

C) domain: [0, ∞)
range: [-1, ∞)

D) domain: [0, ∞)
range: [0, ∞)

Identify the intervals where the function is

20) Increasing




A) (-3, 3)

B) (-3, ∞)

C) (-2, ∞)

D) (-2, 2)

Test the equation for symmetry with respect to the x-axis, the y-axis, and the origin.

21) $y = 3x^2 - 3$

A) y-axis only

B) Origin only

C) x-axis only

D) x-axis, y-axis, origin

Determine whether the given function is even, odd, or neither.

22) $f(x) = -5x^5 + x^3$

A) Even B) Odd C) Neither

Evaluate the piecewise function at the given value.

23) $f(x) = \begin{cases} 4x + 3 & \text{if } x < 2 \\ 5x + 2 & \text{if } x \geq 2 \end{cases}$; $f(3)$

A) 17 B) 14 C) 20 D) 18

Find and simplify the difference quotient $\frac{f(x + h) - f(x)}{h}$, $h \neq 0$ for the given function.

24) $f(x) = 3x - 7$

A) $3 + \frac{-14}{h}$ B) $3 + \frac{6(x - 7)}{h}$ C) 3 D) 0

Find the domain of the function.

25) $g(x) = \frac{2x}{x^2 - 9}$

A) $(-\infty, \infty)$ B) $(-\infty, -3) \cup (-3, 3) \cup (3, \infty)$

C) $(9, \infty)$ D) $(-\infty, 0) \cup (0, \infty)$

26) $\frac{x}{\sqrt{x - 4}}$

A) $(-\infty, 4) \cup (4, \infty)$ B) $[4, \infty)$ C) $(-\infty, \infty)$ D) $(4, \infty)$

Given functions f and g, perform the indicated operations.

27) $f(x) = 8 - 8x$, $g(x) = -4x + 8$

Find $f + g$.

A) $-4x + 16$ B) $-4x + 8$ C) $-12x + 16$ D) $4x$

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

28) $f(x) = -2x + 2$, $g(x) = 3x + 2$

$(g \circ f)(x)$

A) $6x + 8$ B) $-6x + 6$ C) $-6x + 8$ D) $-6x - 4$

29) $f(x) = x^2 - 2x - 5$, $g(x) = x^2 + 2x - 1$

$(f \circ g)(-5)$

A) 955 B) 867 C) 163 D) 251

Given functions f and g, determine the domain of $f + g$.

30) $f(x) = 3x + 3$, $g(x) = \frac{5}{x - 3}$

A) $(0, \infty)$ B) $(-\infty, -5)$ or $(-5, \infty)$ C) $(-\infty, 3)$ or $(3, \infty)$ D) $(-\infty, \infty)$

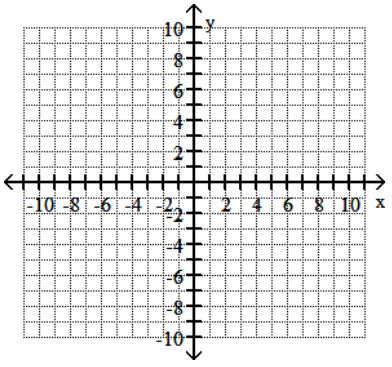
Find the inverse of the one-to-one function.

31) $f(x) = \frac{6x - 7}{5}$

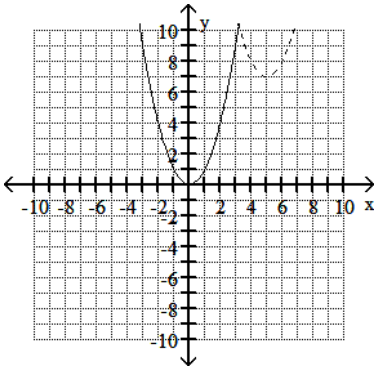
A) $f^{-1}(x) = \frac{5x + 7}{6}$ B) $f^{-1}(x) = \frac{5x - 7}{6}$ C) $f^{-1}(x) = \frac{5}{6x - 7}$ D) $f^{-1}(x) = \frac{5}{6x + 7}$

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

32) $h(x) = (x - 5)^2 + 7$




A)

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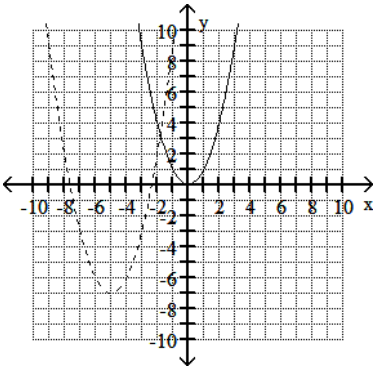


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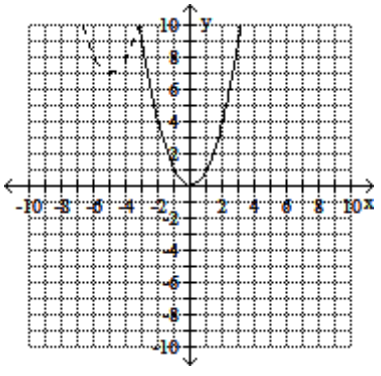
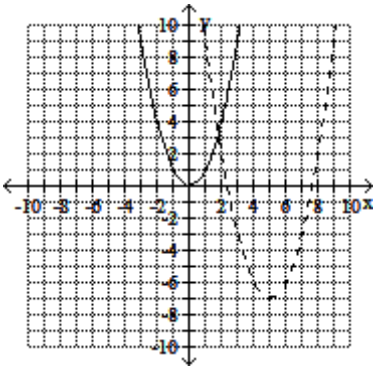



D)




Find the distance between the pair of points.

33) (2, 6) and (-4, -7)

A) 78 B) $\sqrt{133}$ C) $\sqrt{205}$ D) -7

Find the midpoint of the line segment whose end points are given.

34) (6, -6) and (-7, -3)

A) (-1, -9) B) (13, -3) C) $(-\frac{1}{2}, -\frac{9}{2})$ D) $(\frac{13}{2}, -\frac{3}{2})$

Write the standard form of the equation of the circle with the given center and radius.

35) (7, 0); 7

A) $x^2 + (y - 7)^2 = 7$ B) $x^2 + (y + 7)^2 = 7$ C) $(x + 7)^2 + y^2 = 49$ D) $(x - 7)^2 + y^2 = 49$

Find the center and the radius of the circle.

36) $(x + 2)^2 + (y - 3)^2 = 49$

A) (-2, 3), r = 7 B) (-3, 2), r = 49 C) (2, -3), r = 49 D) (3, -2), r = 7

Complete the square and write the equation in standard form. Then give the center and radius of the circle.

37) $x^2 + y^2 - 18x + 4y + 85 = 9$

A) $(x - 9)^2 + (y + 2)^2 = 9$
(-9, 2), r = 9

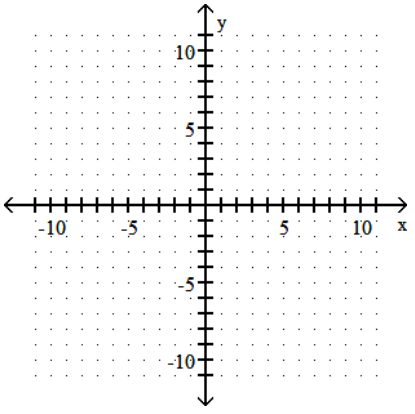
B) $(x + 2)^2 + (y - 9)^2 = 9$
(-2, 9), r = 3

C) $(x + 2)^2 + (y - 9)^2 = 9$
(2, -9), r = 9

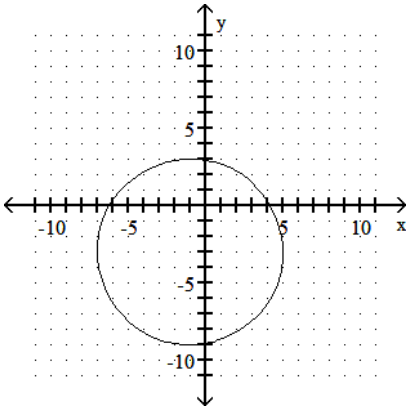
D) $(x - 9)^2 + (y + 2)^2 = 9$
(9, -2), r = 3

Graph the circle.

38) $(x - 1)^2 + (y - 3)^2 = 36$




A)

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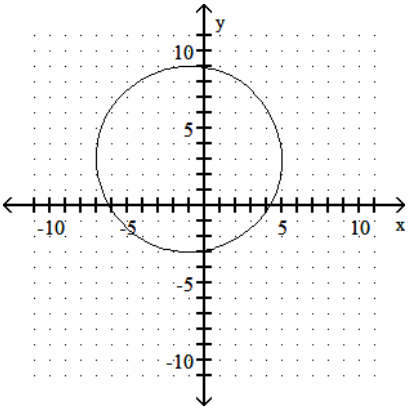
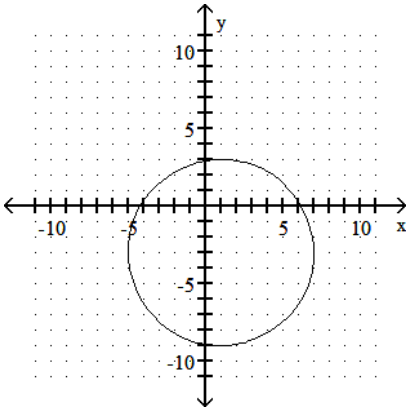
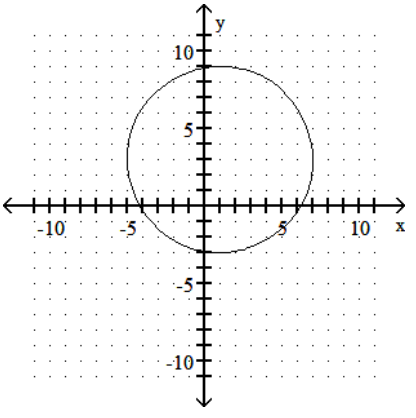



C)




D)



Find the coordinates of the vertex for the parabola defined by the given quadratic function.

39) $f(x) = (x + 3)^2 - 5$

A) (3, 5) B) (-3, -5) C) (3, -5) D) (-3, 5)

40) $f(x) = x^2 - 2x - 4$

A) (-2, 4) B) (1, -7) C) (-1, -1) D) (1, -5)

Find the axis of symmetry of the parabola defined by the given quadratic function.

41) $f(x) = (x + 2)^2 + 7$

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

Find the range of the quadratic function.

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

A) $[-8, \infty)$ B) $[8, \infty)$ C) $[-2, \infty)$ D) $[2, \infty)$

Find the x-intercepts (if any) for the graph of the quadratic function.

43) $f(x) = x^2 + 12x + 15$ Give your answers in exact form.

A) $(6 + \sqrt{21}, 0)$ B) $(-6 \pm \sqrt{21}, 0)$ C) $(-12 \pm \sqrt{15}, 0)$ D) $(6 \pm \sqrt{15}, 0)$

Divide using long division.

44) $\dfrac{4m^3 + 21m^2 - 42m + 49}{m + 7}$

A) $m^2 + 7m + 4$ B) $4m^2 + 7m + 7$ C) $4m^2 - 7m + 7$ D) $m^2 + 8m + 9$

45) $\dfrac{x^4 + 16}{x - 2}$

A) $x^3 - 2x^2 + 4x - 8 + \dfrac{32}{x - 2}$ B) $x^3 + 2x^2 + 4x + 8 + \dfrac{32}{x - 2}$

C) $x^3 + 2x^2 + 4x + 8$ D) $x^3 + 2x^2 + 4x + 8 + \dfrac{16}{x - 2}$

Solve the inequality by the test-point method. Write the solution in interval notation.

46) $x^2 - 3x - 18 < 0$

A) (-3, 6) B) $(-\infty, -3)$ C) $(-\infty, -3) \cup (6, \infty)$ D) $(6, \infty)$

Solve the rational inequality. Write the solution in interval notation.

47) $\dfrac{x}{x - 4} < 3$

A) (-4, 4) B) $(4, 6)$ C) $(-\infty, 4) \cup (6, \infty)$ D) $\varnothing$

Use the compound interest formulas to solve.

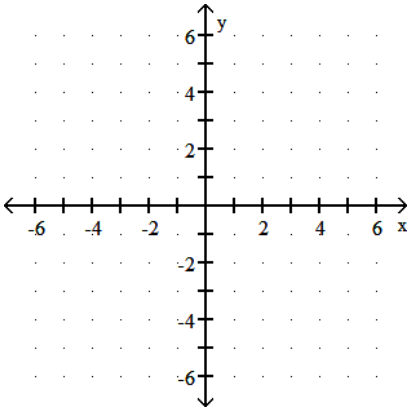
48) Find the accumulated value of an investment of $6000 at 4% compounded semiannually for 8 years.
A) $8236.71 B) $8211.41 C) $7920.00 D) $7029.96

49) Find the accumulated value of an investment of $2000 at 8% compounded continuously for 4 years.
A) $2640.00 B) $2754.26 C) $2720.98 D) $2854.26

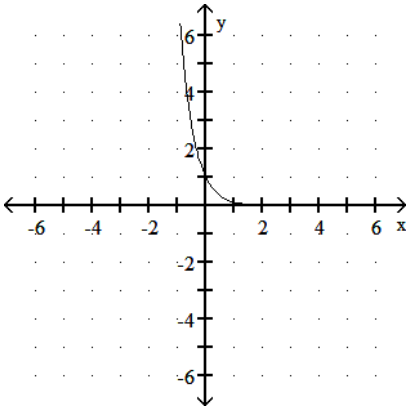
50) Find out how long it takes a $3000 investment to double if it is invested at 7% compounded monthly. Round to the nearest tenth of a year.
A) 10.1 years B) 9.9 years C) 10.3 years D) 9.7 years

Graph the function.

51) Use the graph of $f(x) = 2^x$ to obtain the graph of $g(x) = 2^{x-3}$.




A)

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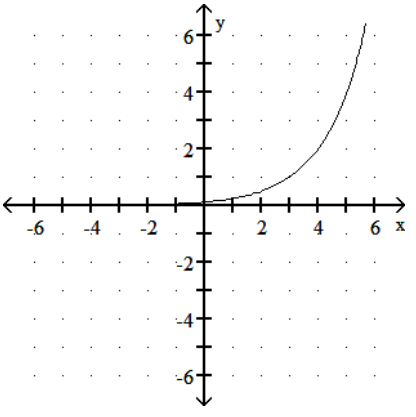
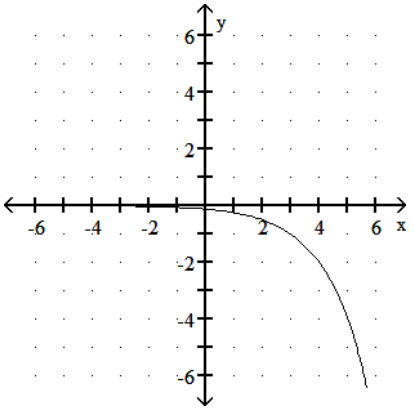
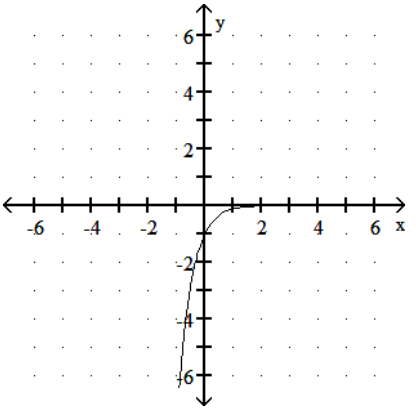



C)




D)



Solve the equation by expressing each side as a power of the same base and then equating exponents.

52) $2^{(3x + 5)} = \frac{1}{16}$

A) {3} B) $\left\{\frac{1}{8}\right\}$ C) {8} D) {-3}

Write the equation in its equivalent exponential form.

53) $\log_2 4 = x$

A) $2^x = 4$ B) $x^2 = 4$ C) $4^2 = x$ D) $4^x = 2$

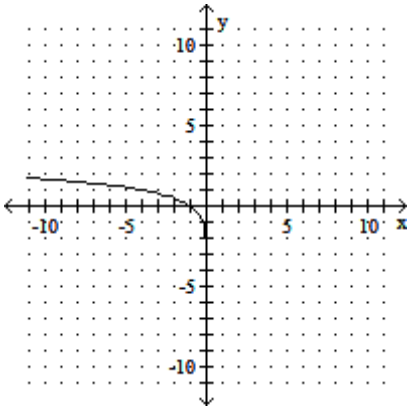
Write the equation in its equivalent logarithmic form.

54) $4^3 = y$

A) $\log_y 4 = 3$ B) $\log_4 y = 3$ C) $\log_3 y = 4$ D) $\log_y 3 = 4$

The graph of a logarithmic function is given. Select the function for the graph from the options.

55)




A) $f(x) = \log_4 x$ B) $f(x) = 1 - \log_4 x$ C) $f(x) = \log_4 (-x)$ D) $f(x) = -\log_4 x$

Find the domain of the logarithmic function.

56) $f(x) = \log_3 (x - 8)$

A) (8, ∞) B) (-8, ∞) C) (-∞, 8) or (8, ∞) D) (-∞, 0) or (0, ∞)

Evaluate the expression.

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

A) 12 B) 3 C) -3 D) $\frac{1}{3}$

Evaluate the expression without using a calculator.

58) $\log_{12} 12$

A) 1 B) $\frac{1}{12}$ C) 12 D) 0

Use properties of logarithms to expand the logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions.

59) $\log_7 (7x)$

A) 1 B) 7 C) $1 + \log_7 x$ D) x

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

60) $\log\left(\frac{x}{10}\right)$

A) $\log x + 1$ B) $10x$ C) $-10x$ D) $\log x - 1$

Use properties of logarithms to expand the logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions.

61) $\log_w\left(\frac{13x}{2}\right)$

A) $\log_w 13x - \log_w 2$ B) $\log_w 13 + \log_w x - \log_w 2$

C) $\log_w 13 + \log_w x + \log_w 2$ D) $\log_w 11x$

Use common logarithms or natural logarithms and a calculator to evaluate to four decimal places

62) $\log_{26} 390$

A) 1.1761 B) 4.0060 C) 1.8312 D) 0.5461

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

63) $5^{x+6} = 3$

A) {ln 3 - ln 5 - ln 6} B) $\left\{\frac{\ln 5}{\ln 3} + 6\right\}$ C) $\left\{\frac{\ln 5}{\ln 3} + \ln 6\right\}$ D) $\left\{\frac{\ln 3}{\ln 5} - 6\right\}$

64) $e^{x+7} = 5$

A) {ln 12} B) {ln 5 - 7} C) $\{e^{35}\}$ D) $\{e^5 + 7\}$

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.

65) $\log_5 (x + 3) = 3$

A) {246} B) {122} C) {240} D) {128}

66) $\log_2 x + \log_2 (x - 3) = 2$

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

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

A) $\left\{\frac{9}{4}\right\}$ B) $\left\{\frac{1}{4}\right\}$ C) $\left\{-\frac{9}{4}\right\}$ D) $\left\{\frac{3}{2}\right\}$

Solve the system of equations by the substitution method.

68)

$y = 4x - 3$

$2y + 8x = 26$

A) $\{(5, 2)\}$ B) $\{(-2, 5)\}$ C) $\{(2, 5)\}$ D) $\emptyset$

Solve the system by the elimination by addition method.

69) $7x + 8y = -19$

$4x - 3y = -26$

A) $\{(-5, 3)\}$ B) $\{(-5, 2)\}$ C) $\{(-6, 3)\}$ D) $\emptyset$

Solve the system by the method of your choice.

70) $y = 18 - 6x$

$6x + y = 54$

A) $\{(12, 6)\}$ B) $\{(10, 12)\}$

C) $\{(x, y) \mid 6x + y = 18\}$ D) $\emptyset$

Solve the system of equations.

71) $x + y + z = 2$

$x - y + 2z = -3$

$2x + y + z = 0$

A) $\{(1, -2, 3)\}$ B) $\{(1, 3, -2)\}$ C) $\{(3, -2, 1)\}$ D) $\{(-2, 3, 1)\}$

Solve the problem.

72) A vendor sells hot dogs, bags of potato chips, and soft drinks. A customer buys 5 hot dogs, 4 bags of potato chips, and 5 soft drinks for $17.00. The price of a hot dog is $1.25 more than the price of a bag of potato chips. The cost of a soft drink is $2.25 less than the price of two hot dogs. Find the cost of each item.

A) $2.00 for a hot dog; $0.75 for a bag of potato chips; $1.25 for a soft drink

B) $1.75 for a hot dog; $0.50 for a bag of potato chips; $1.25 for a soft drink

C) $0.50 for a hot dog; $1.75 for a bag of potato chips; $1.25 for a soft drink

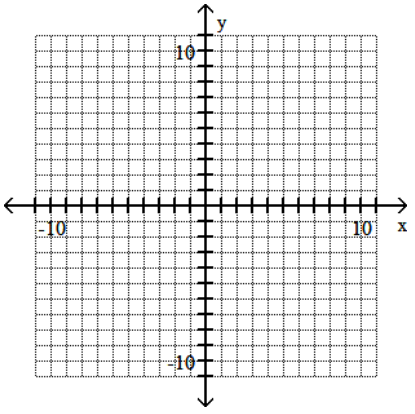
D) $1.75 for a hot dog; $1.25 for a bag of potato chips; $0.50 for a soft drink

73) The Family Fine Arts Center charges $21 per adult and $15 per senior citizen for its performances. On a recent weekend evening when 525 people paid admission, the total receipts were $8973. How many who paid were senior citizens?

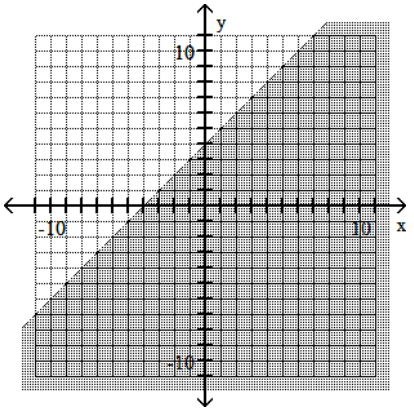
A) 342 senior citizens B) 273 senior citizens C) 183 senior citizens D) 252 senior citizens

Graph the inequality.

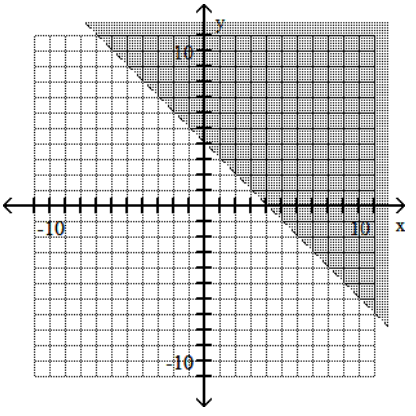
74) x - y > -4



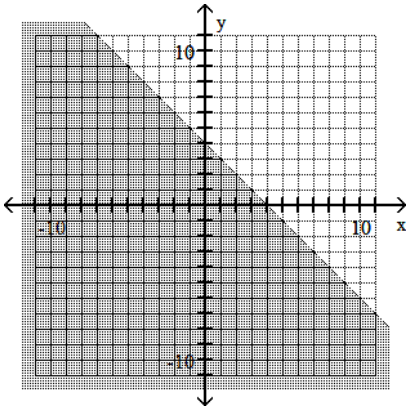

A)



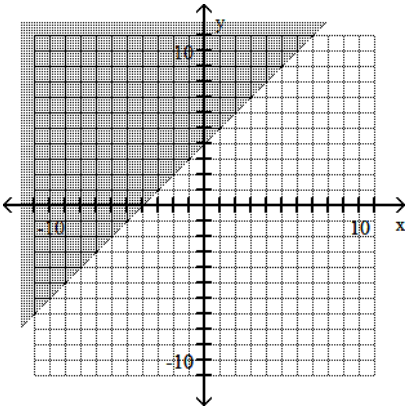

B)




C)



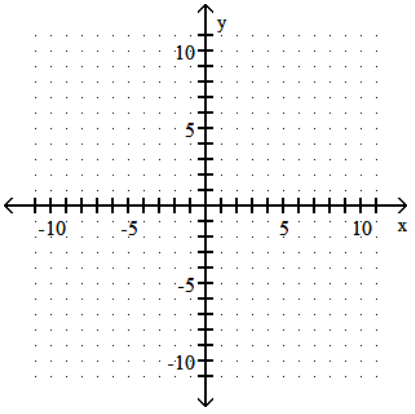

D)



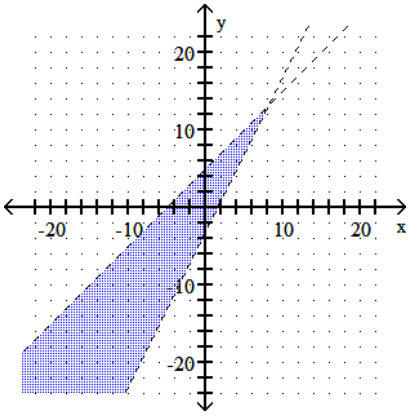
Graph the solution set of the system of inequalities or indicate that the system has no solution.

75) $y < -x + 5$

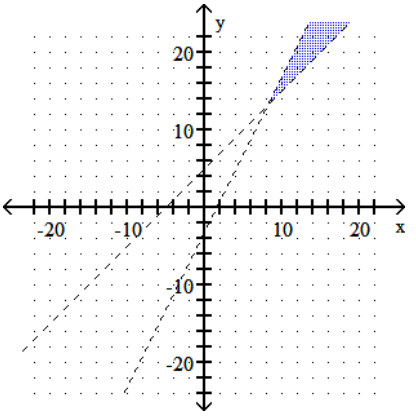
$y > 2x - 3$



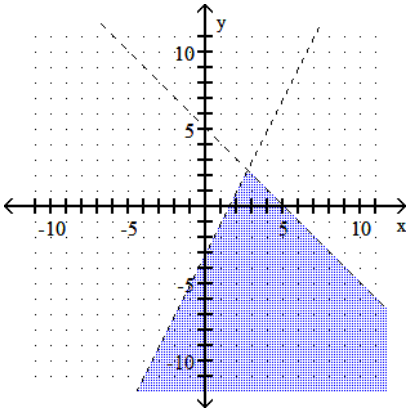

A)



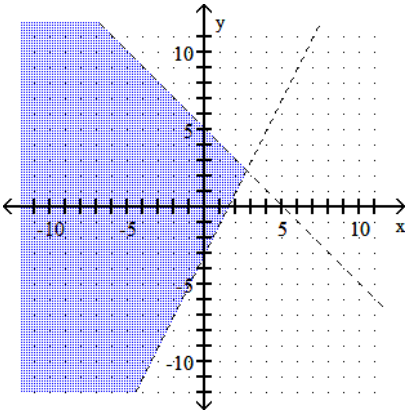

B)




C)




D)



Answer Key

1105 FINALREVIEW

1) B
2) D
3) B
4) D
5) D
6) A
7) D
8) D
9) B
10) A
11) B
12) C
13) C
14) A
15) C
16) B
17) A
18) A
19) C
20) D
21) A
22) B
23) A
24) C
25) B
26) D
27) C
28) C
29) C
30) C
31) A
32) A
33) C
34) C
35) D
36) A
37) D
38) D
39) B
40) D
41) C
42) B
43) B
44) C
45) B
46) A
47) C
48) A
49) B
50) B
51) B
52) D
53) A
54) B
55) C
56) A
57) C
58) A
59) C
60) D
61) B
62) C
63) D
64) B
65) B
66) A
67) A
68) C
69) B
70) D
71) D
72) B
73) A
74) A
75) D