Supplemental Math 1010 Topics – Practice

Name_____

Simplify the complex fractions.

1) $\dfrac{\frac{x}{9}}{\frac{5}{x+6}}$

2) $\dfrac{\frac{x}{4}}{\frac{7}{x+9}}$

3) $\dfrac{\frac{y}{3}}{\frac{5}{y-6}}$

4) $\dfrac{\frac{4}{y}}{\frac{5}{y+4}}$

5) $\dfrac{\frac{9}{y}}{\frac{6}{y-8}}$

6) $\dfrac{\frac{1}{a}+1}{\frac{1}{a}-1}$

7) $\dfrac{4+\frac{2}{x}}{\frac{x}{3}+\frac{1}{6}}$

8) $\dfrac{\frac{16s^2-36t^2}{st}}{\frac{4}{t}-\frac{6}{s}}$

9) $\dfrac{\frac{y}{7}}{\frac{8}{y-4}}$

10) $\dfrac{\frac{8}{y}}{\frac{7}{y+7}}$

11) $\dfrac{\frac{6}{y}}{\frac{8}{y-9}}$

12) $\dfrac{\frac{1}{a}+1}{\frac{1}{a}-1}$

13) $\dfrac{9+\frac{3}{x}}{\frac{x}{4}+\frac{1}{12}}$

14) $\dfrac{\frac{36t^2-49u^2}{tu}}{\frac{6}{u}-\frac{7}{t}}$

Solve the distance and proportion problems. Round your answers, as needed.

15) Dr. Taylor can see 8 patients in 4 hours. At this rate, how long would it take him to see 24 patients?

16) Doug and Inga can deliver 56 papers in 4 hours. How long would it take them to deliver 42 papers?

17) Mara can type 28 words per minute. How many words would she type in $\frac{1}{2}$ hour (30 minutes)?

18) A machine can fill 6812 boxes of cereal in 0.8 hour. How many boxes of cereal can it fill per hour?

19) On a map of the United States, the distance between Phoenix and Reno is 2.4 inches. The two cities are actually 768 miles apart. On this same map, what would be the distance between two cities that are 1408 miles apart?

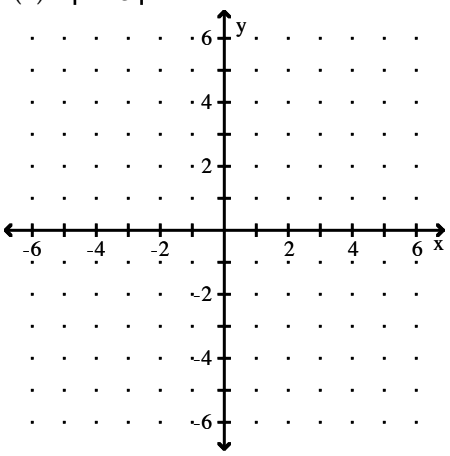
20) Chuck and Dana agree to meet in Chicago for the weekend. Chuck travels 99 miles in the same time that Dana travels 81 miles. If Chuck's rate of travel is 6 mph more than Dana's, and they travel the same length of time, at what speed does Chuck travel?

21) Tom Quig traveled 280 miles east of St. Louis. For most of the trip he averaged 60 mph, but for one period of time he was slowed to 10 mph due to a major accident. If the total time of travel was 8 hours, how many miles did he drive at the reduced speed?

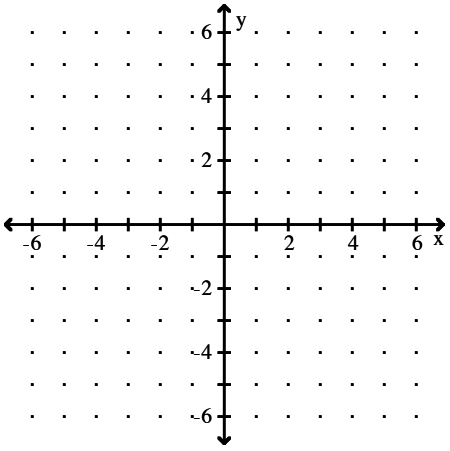
22) A man rode a bicycle for 12 miles and then hiked an additional 8 miles. The total time for the trip was 5 hours. If his rate when he was riding a bicycle was 10 miles per hour faster than his rate walking, what was each rate?

Graph the absolute value functions. Give the domain and range of each function.

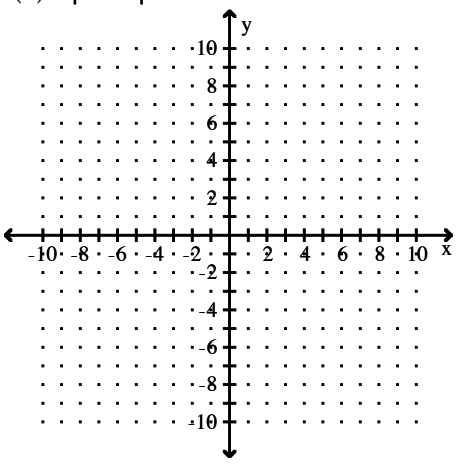
23) $f(x) = |x + 5|$



24) $f(x) = |x - 5|$

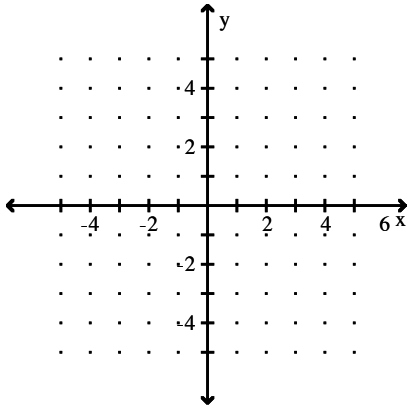


25) $f(x) = |x - 6| + 2$

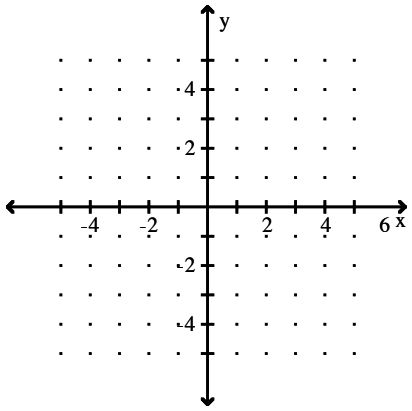


Graph the rational functions. Give the domain and range of each function.

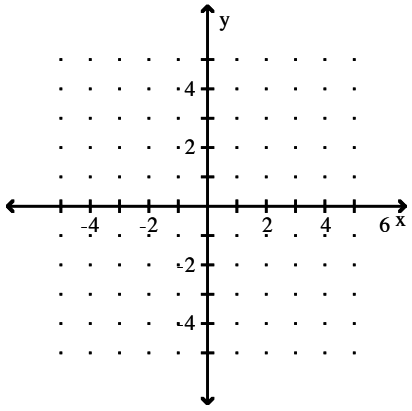
26) $f(x) = \frac{1}{x - 1}$



27) $f(x) = -\frac{3}{x}$

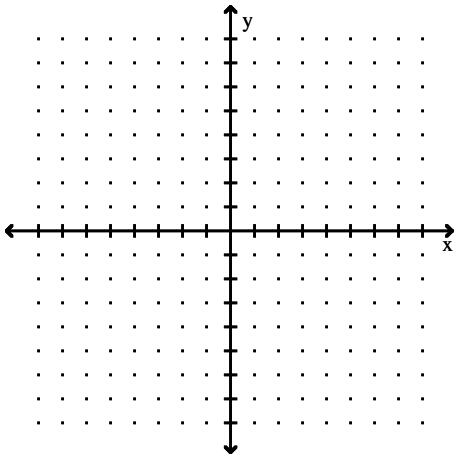


28) $f(x) = \frac{1}{x} - 2$

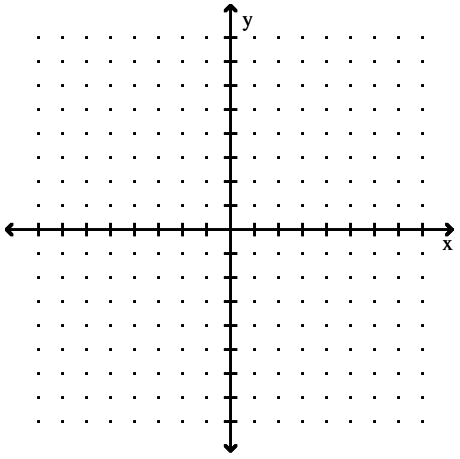


Graph the radical functions. Give the domain and range of each function.

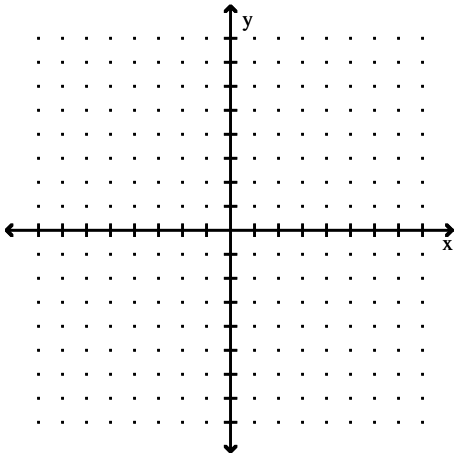
29) $f(x) = \sqrt{x - 4}$



30) $f(x) = \sqrt{x + 1}$



31) $f(x) = \sqrt{x + 2} - 5$



Solve the equations that are quadratic in form.

32) $(4m + 1)^2 - 8(4m + 1) + 12 = 0$

33) $(9p - 4)^2 = 9(9p - 4) - 8$

34) $16x^4 - 41x^2 + 25 = 0$

35) $x^4 + 675 = 84x^2$

Find the vertex, axis of symmetry, domain, and range of the given parabolas.

36) $f(x) = x^2 - 3$

37) $f(x) = 2x^2 - 20x + 46$

38) $f(x) = 4x^2 + 40x + 103$

39) $f(x) = 9x^2 - 72x + 152$

Use the discriminant of the equation to determine the number of x–intercepts.

40) $f(x) = x^2 + 8x + 17$
A) No x–intercepts
B) One x–intercept
C) Two x–intercepts

41) $f(x) = -x^2 - 7x + 7$
A) No x–intercepts
B) Two x–intercepts
C) One x–intercept

42) $f(x) = 5x^2 - 10x + 5$
A) Two x–intercepts
B) One x–intercept
C) No x–intercepts

43) $f(x) = -6x^2 - 12x + 6$
A) One x–intercept
B) Two x–intercepts
C) No x–intercepts

Solve the problems using your understanding of parabolas.

44) John owns a hot dog stand. He has found that his profit is given by the equation $P = -x^2 + 50x + 74$, where x is the number of hot dogs sold. How many hot dogs must he sell to earn the most profit?

45) A projectile is thrown upward so that its distance above the ground after t sec is given by $h(t) = -14t^2 + 504t$. After how many seconds does it reach its maximum height?

46) Which pair of numbers whose sum is 86 has the largest product?

47) A gardener is fencing off a rectangular area with a fixed perimeter of 92 ft. What is the maximum area?

Determine whether or not the function is one–to–one.

48) {(16, 8), (3, 20), (–12, 14)}

49) {(–8, 5), (9, 5), (4, –14)}

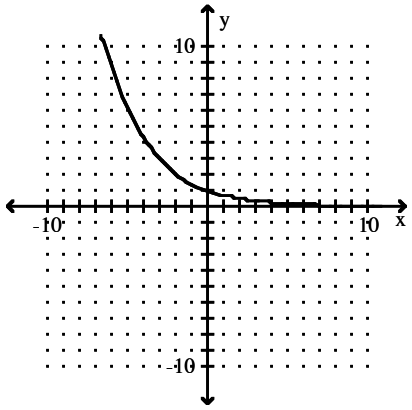
50) $f(x) = 6x + 1$

51) $f(x) = x^2 - 6$

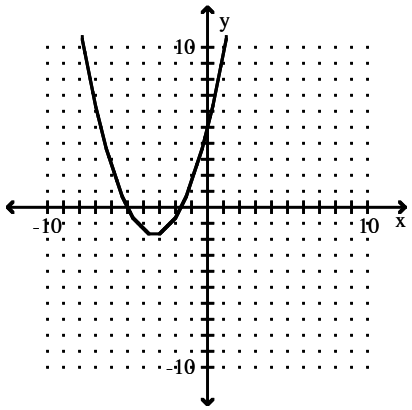
52) $f(x) = \sqrt{4 - x^2}$

53) $f(x) = |4 - x^2|$

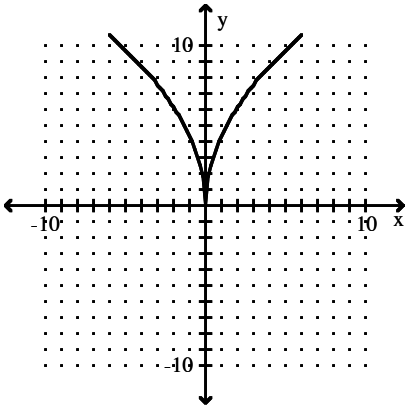
54)



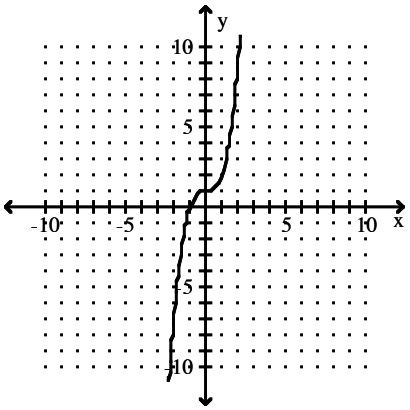
55)



56)



57)



If the following defines a one–to–one function, find its inverse. If not, write "Not one–to–one."

58) {(–2, 4), (2, –4), (8, –2), (–8, 2)}

59) $f(x) = 8x^2 - 1$

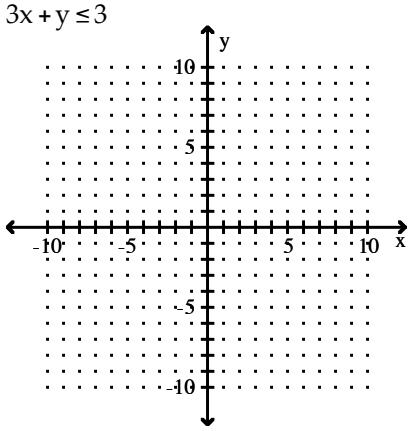
60) $f(x) = 6x - 2$

61) $f(x) = \dfrac{7}{x + 4}$

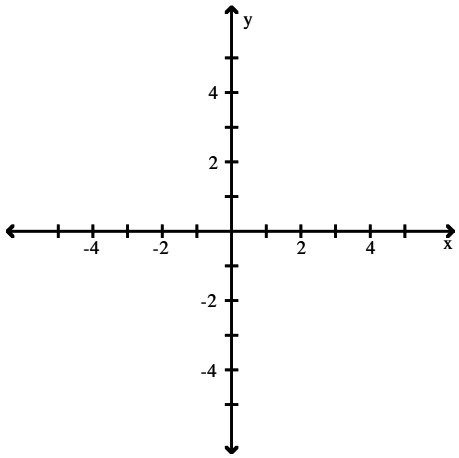
62) $f(x) = \sqrt{x - 9}$

Graph the linear inequality in two variables.

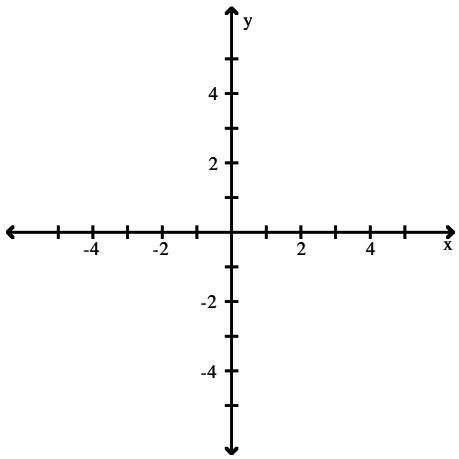
63) $3x + y \leq 3$



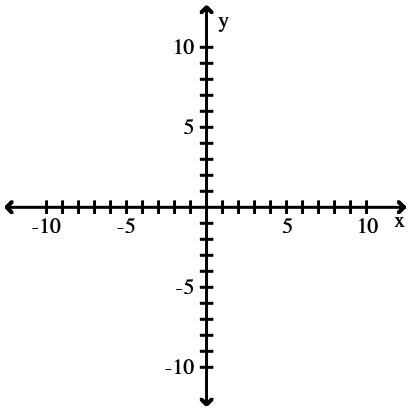
64) $x + y \geq 2$ and $y \leq 2$



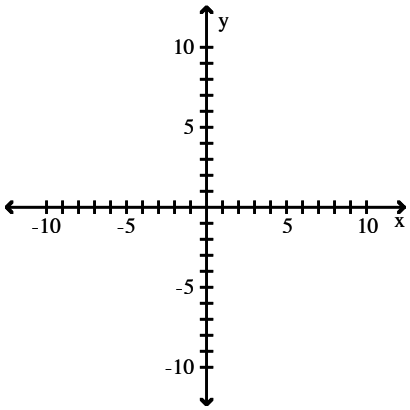
65) $x + 2y \leq 2$ and $x + y \geq 0$



66) $3x + 2y > 4$ or $x > 2$



67) $2x + y < 6$ or $3x - 2y > 5$



Simplify the given expressions. Assume that all variables represent positive real numbers.

68) $\sqrt[3]{x^{18}}$

69) $125^{4/3}$

70) $\left(256\frac{a^2b^{-2}}{a^{-2}b^6}\right)^{1/4}$

71) $\sqrt{225}+\sqrt{36}$

72) $\sqrt{3x}+5\sqrt{48x}+6\sqrt{27x}$

73) $(\sqrt{7}+5)(\sqrt{5}+2)$

Solve the given equations.

74) $\sqrt{q+3}=9$

75) $\sqrt{6x-4}-10=0$

76) $\sqrt{x}+3=0$

77) $\sqrt{x+3}=x-3$

Solve the application problems.

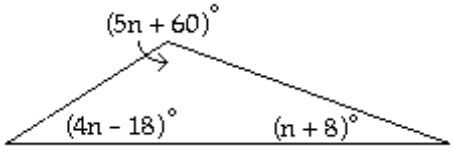
78) A biologist collected 237 fern and moss samples. There were 133 fewer ferns than moss samples. How many fern samples did the biologist collect?

79) After receiving a discount of 8.5% on its bulk order of typewriter ribbons, John's Office Supply pays $4575. What was the price of the order before the discount?

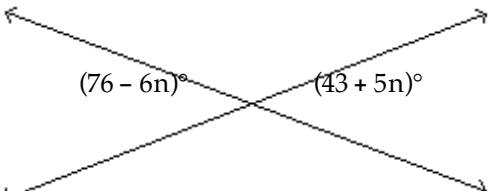
80) Walt made an extra $5000 last year from a part–time job. He invested part of the money at 8% and the rest at 7%. He made a total of $360 in interest. How much was invested at 7%?

81) The speed of a stream is 4 mph. If a boat travels 92 miles downstream in the same time that it takes to travel 46 miles upstream, what is the speed of the boat in still water?

82) Find the measure of each angle in the triangle.



83) Find the measures of the vertical angles.



84) The sum of three consecutive odd integers is 177. Find the integers.

85) Two pages that face each other in a book have 497 as the sum of their page numbers. What is the number of the page that comes first?

86) If three times the smaller of two consecutive integers is added to four times the larger, the result is 88. Find the smaller integer.

87) During the 1998–1999 Little League season, the Tigers played 48 games. They won 6 more games than they lost. How many games did they lose that season?

88) Two angles are supplementary, and one is 5° more than six times the other. Find the larger angle.

89) A sum of money amounting to $5.70 consists of dimes and quarters. If there are 30 coins in all, how many are quarters?

90) One maid can clean the house three times faster than another. Working together they can clean the entire house in 3 hours. How long would it take the faster maid cleaning alone?

91) A projectile is thrown upward so that its distance above the ground after t sec is given by $h(t) = -12t^2 + 528t$. After how many seconds does it reach its maximum height?

92) An animal species is introduced into a certain area. Its population is approximated by $F(t) = 400 \log_{10}(2t + 3)$, where t represents the number of months since its introduction. Find the population of this species 6 months after its introduction into the area. Round answer to the nearest whole number.

93) Find the amount of money in an account after 3 years if $2400 is deposited at 4% annual interest compounded monthly.

94) A sample of 800 grams of radioactive substance decays according to the function $A(t) = 800e^{-0.037t}$, where t is the time in years. How much of the substance will be left in the sample after 20 years? Round your answer to the nearest whole gram.

1) $\frac{x(x+6)}{45}$

2) $\frac{x(x+9)}{28}$

3) $\frac{y(y-6)}{15}$

4) $\frac{4(y+4)}{5y}$

5) $\frac{3(y-8)}{2y}$

6) $\frac{1+a}{1-a}$

7) $\frac{12}{x}$

8) $4s+6t$

9) $\frac{y(y-4)}{56}$

10) $\frac{8(y+7)}{7y}$

11) $\frac{3(y-9)}{4y}$

12) $\frac{1+a}{1-a}$

13) $\frac{36}{x}$

14) $6t+7u$

15) 12 hours

16) 3.0 hours

17) 840 words

18) 8515 boxes

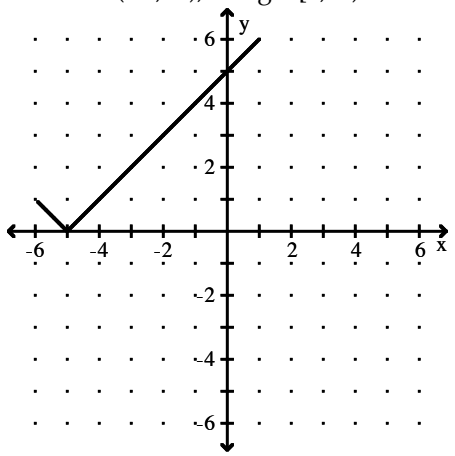
19) 4.4 inches

20) 33 mph

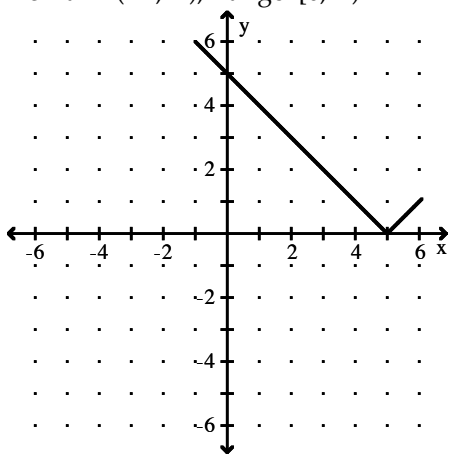
21) 40 miles

22) Bike: 12 mph
Hike: 2 mph

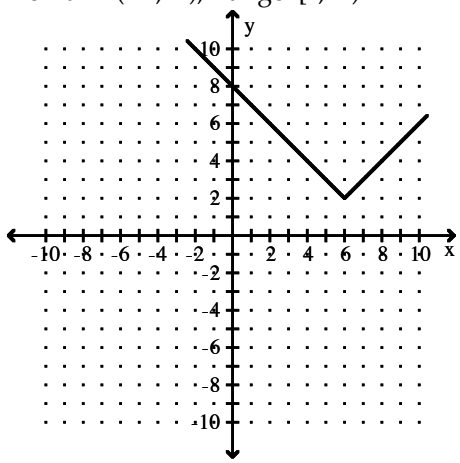
23) Domain: $(-\infty, \infty)$; Range: $[0, \infty)$



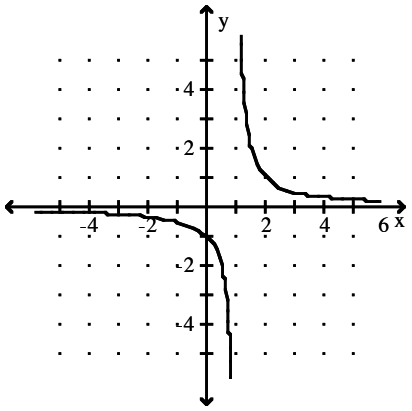
24) Domain: $(-\infty, \infty)$; Range: $[0, \infty)$



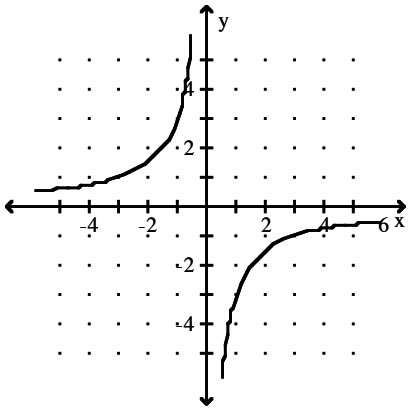
25) Domain: $(-\infty, \infty)$; Range: $[2, \infty)$



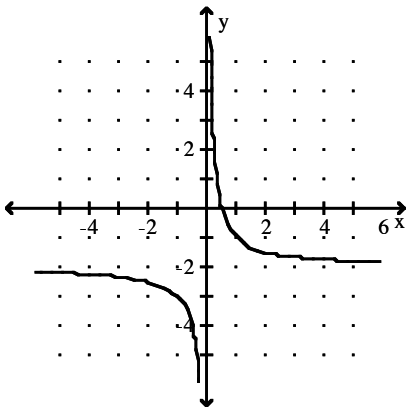
26)



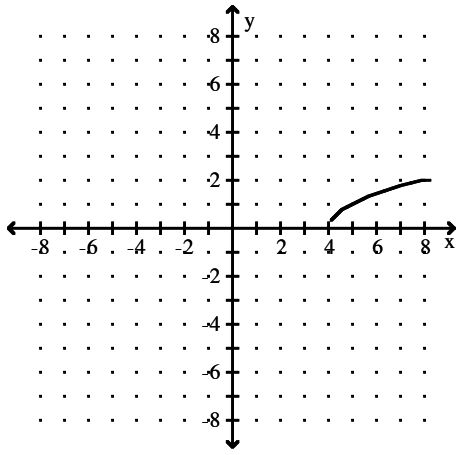
27)



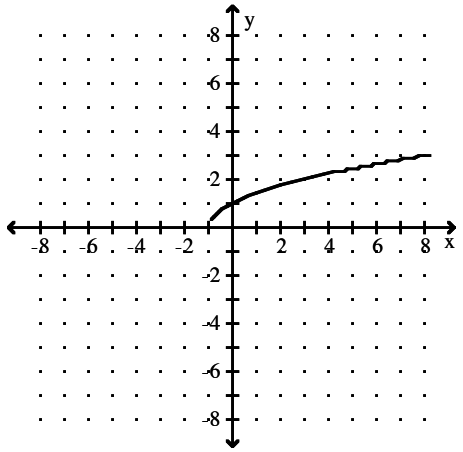
28)



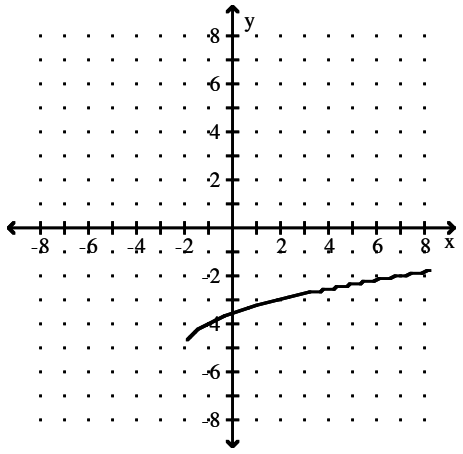
29)



30)



31)

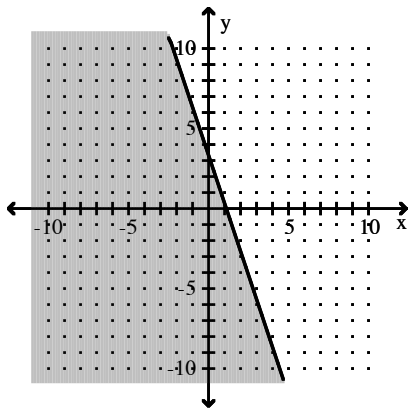


32) $\left\{\frac{5}{4}, \frac{1}{4}\right\}$

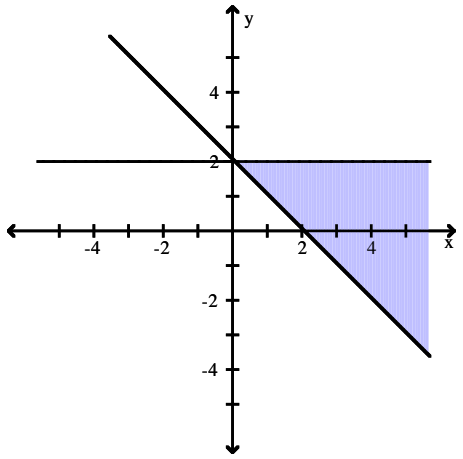
33) $\left\{\frac{5}{9}, \frac{4}{3}\right\}$

34) $\left\{-\frac{5}{4}, -1, 1, \frac{5}{4}\right\}$

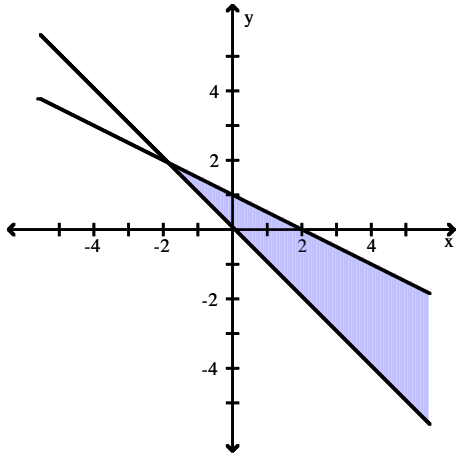
35) $\{-5\sqrt{3}, -3, 3, 5\sqrt{3}\}$
36) (0, –3)
37) (5, –4)
38) (–5, 3)
39) (4, 8)
40) A
41) B
42) B
43) B
44) 25 hot dogs
45) 18 sec
46) 43 and 43
47) 529 ft^2
48) Yes
49) No
50) Yes
51) No
52) No
53) No
54) Yes
55) No
56) No
57) Yes
58) {(4, –2), (–4, 2), (–2, 8), (2, –8)}
59) Not one–to–one
60) $f^{-1}(x) = \frac{x + 2}{6}$
61) $f^{-1}(x) = \frac{-4x + 7}{x}$
62) $f^{-1}(x) = x^2 + 9, x \geq 0$
63)



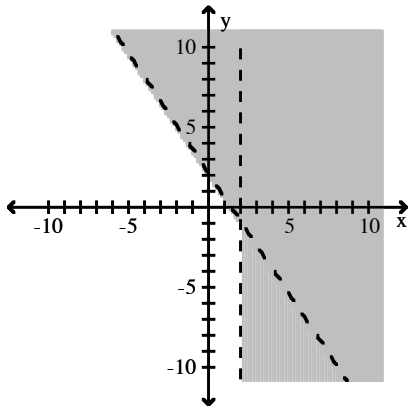
64)



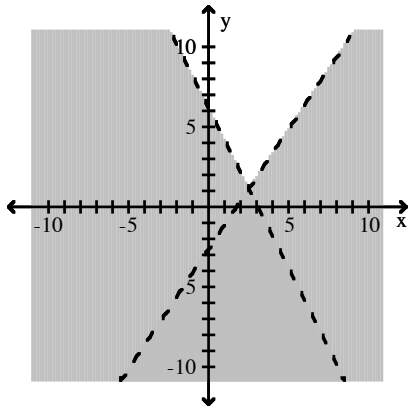
65)



66)



67)



68) x^6

69) 625

70) $\frac{4a}{b^2}$

71) 21

72) $39\sqrt{3x}$

73) $\sqrt{35} + 2\sqrt{7} + 5\sqrt{5} + 10$

74) {78}

75) $\left\{\frac{52}{3}\right\}$

76) $\emptyset$

77) {6}

78) 52 fern samples

79) $5000

80) $4000

81) 12 mph

82) 34°, 125°, 21°

83) 58°, 58°

84) 57, 59, 61

85) 248

86) 12

87) 21 games

88) 155°

89) 18 quarters

90) 4 hr

91) 22 sec

92) 470 animals

93) $2705.45

94) 382 g