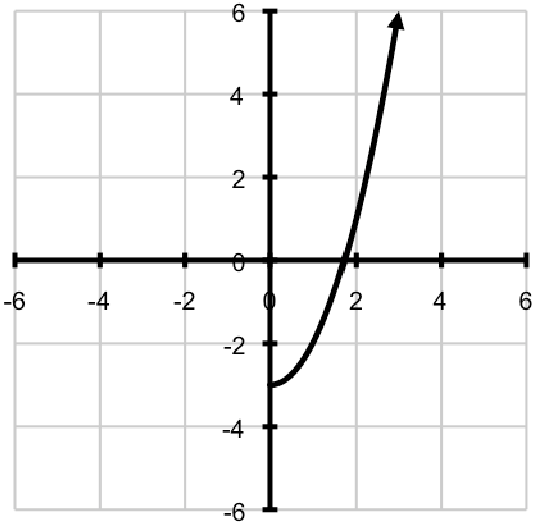
Math 0303 Course Review

a) Is the following relation a function? Why or why not?
b) Find the domain.
c) Find the range.

1)



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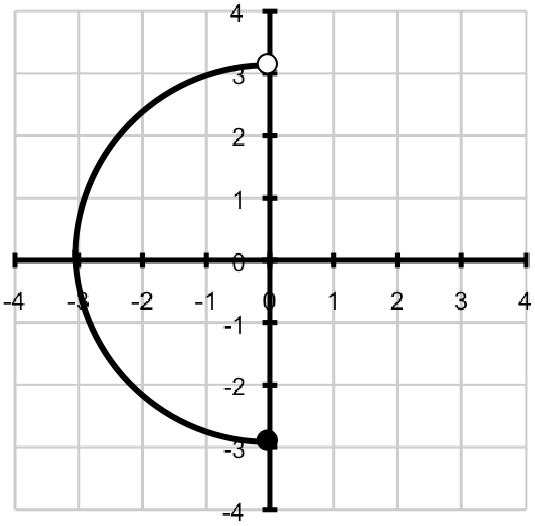

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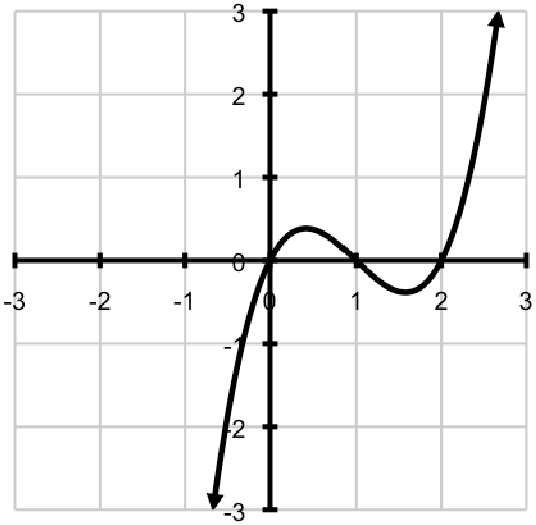

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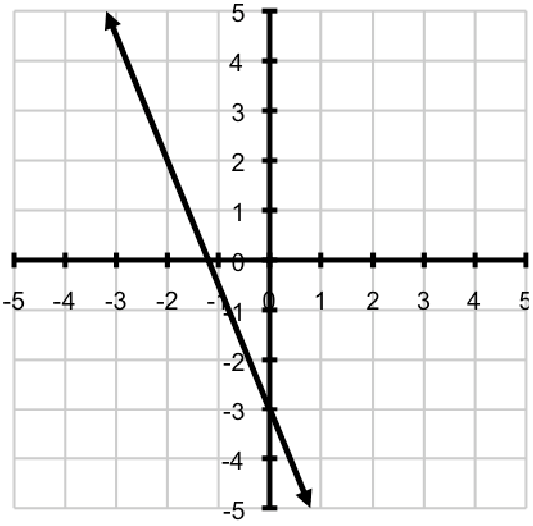


Find the domain of each function. Write the answer in interval notation:

5) $g(x) = \sqrt{4x-7}$

6) $f(x) = \frac{x^2-9}{6x^4-11x^3-10x^2}$

7) $h(x) = \sqrt{x^2+16}$

8) $g(x) = \frac{1}{\sqrt[4]{6-5x}}$

9) $f(x) = \sqrt[5]{2x+3}$

10) $h(x) = \sqrt{\frac{x+4}{4-x^2}}$

11) $g(x) = \frac{1}{\sqrt{3x-5}}$

12) $f(x) = |3x - 5|$

Sketch the graph of the following (be sure to label the axes):

13) $x = -2$

14) $2x + 3y = -6$

15) $\frac{2}{3}x - y < -4$

16) $y \geq 2$

Given $f(x) = x^2 - 9$ and $g(x) = 2x + 5$, find:

17a) $f(4) + g(5)$

17b) $f(2) \cdot g(2)$

18a) $\frac{g(3)}{f(3)}$

18b) $8\sqrt{f(9)-g(6)}$

Solve:

19) $2x + 5y = 3$
$x - 5y = 9$

20) $5x + 3y = 3$
$2x - 4y = -30$

21) $x + \frac{1}{7}y = 9$
$y = -7x + 6$

22) $2x + y = 8$
$-x + 4y = 14$

Find the equation of the line (slope-intercept form) satisfying the following:

23) The line passes through (3, 6) and (– 5, 4).

24) The line passing through the point (0, – 2) and having slope of $\frac{2}{3}$.

25) The line passes through (– 5, – 2) and is parallel to $5y - 3x = 2$.

26) The line passes through (2, – 7) and is perpendicular to $7x + 3y = 1$.

Given f = {(9, 5), (6, 3), (3, 4), (8, 2)}, find

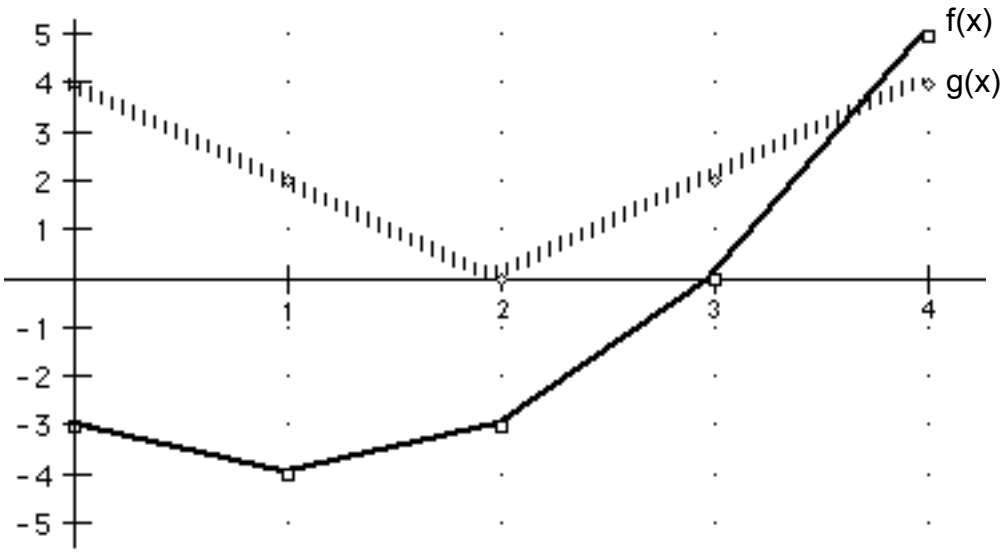
27a) f(9)

27b) f(8)

28a) f(2)

28b) f(f(6))

Given the graph of f(x) and g(x) below, find:



29a) f(2) 29b) x such that g(x) = 4. 29c) where is f decreasing?

Determine if the function is constant, linear, quadratic, or neither:

30) $g(x) = 8x - 3$

31) $h(x) = 3\,|\,x - 5\,| + 2$

32) $f(x) = 5x^2 - 7x$

33) $f(x) = \frac{7}{3x-5}$

34) $h(x) = -3.845$

Solve, graph, and write the answer in interval notation:

35) $\frac{x}{8} - \frac{1}{6} \geq \frac{2}{3}x$ or $x > 5$

36) $-2x + 9 \leq 7$ and $5x + 1 < 16$

37) $3x - 7 > -4$ or $2x - \frac{1}{6} \geq 1$

38) $-4x + 3 > -8$ or $4 - 3x \leq 0$

39) $5 - 2x > 9$ and $3x + 6 \geq 9$

40) $-3 \leq 2 - \frac{x}{3} < 5$

Determine if the following systems of equations are consistent, inconsistent or dependent:

41) $x = 5$
$y = 3$

42) $6x - 4y = 1$
$6y = 9x - 5$

43) $14x + 8y = 24$
$21x = -12y + 36$

44) $10x + 8y = 3$
$y = \frac{4}{5}x + 2$

Solve by graphing (Be sure to use graph paper):

45) $2x + 3y = 6$
$x = -3$

46) $y = -3x + 5$
$x - 2y = -3$

47) $y - 3x = 4$
$2x - y = -3$

48) $3x + 4y = 12$
$0.75x = -2 - y$

Set up the equation(s) and solve:

49) Juanita and Elroy leave Houston at the same time traveling in opposite directions. Juanita is averaging 30 mph faster than Elroy. After 4.5 hours, they are 450 miles apart. How fast was Elroy traveling? How far did Juanita travel?

50) If the measure of angle is 3 degrees less than five times the measure of the complement, find the angles.

51) In a fund-raiser for a local group, each adult plate sold for $7 and each child plate sold for $5. If the group sold 45 plates and received $295 for the event, how many of each type of plate were sold?

52) Leroy had a total of $18,000 invested in two different mutual funds, one that paid 9% interest and another that paid 7% interest. If the total interest was $1460, how much was invested at each rate?

53) Marigold bought some miniature chocolate candy bars and hard candy for a total of $27. If the chocolates were priced at $2.25 a pound and the hard candy was priced at $1.50 per pound and she had a total of 14 pounds of candy, how much did she buy of each?

54) How many liters of a 30% alcohol solution must be mixed with 120 liters of a 10% alcohol solution to produce a 15% solution?

Set–up the equation(s) and solve:

55) Juanita and Elroy leave Houston at the same time traveling in opposite directions. Juanita is averaging 30 mph faster than Elroy. After 4.5 hours, they are 450 miles apart. How fast was Elroy traveling? How far did Juanita travel?

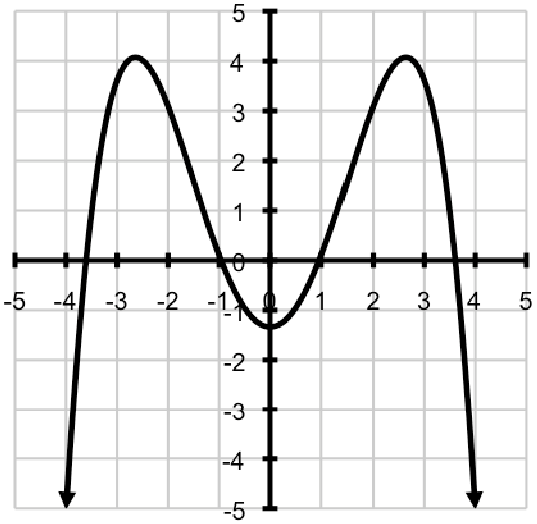
56) If the measure of angle is 3 degrees less than five times the measure of the complement, find the angles.

57) In a fund-raiser for a local group, each adult plate sold for $7 and each child plate sold for $5. If the group sold 45 plates and received $295 for the event, how many of each type of plate were sold?

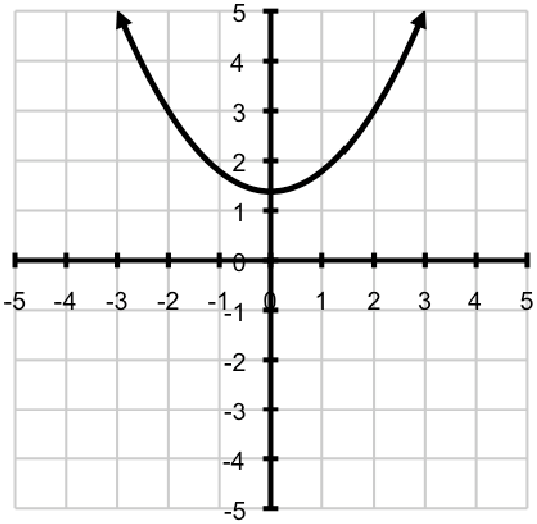
58) What is the minimum product of two numbers that differ by 10? What are the numbers?

Solve:

59) f(x) = 0



60) g(x) = 1



61) $\frac{3x}{x-1} = \frac{2}{x-2} - \frac{2}{x^2-3x+2}$

62) $5x^2 - 4x = 6$

63) $x^4 - 25x^2 = -144$

64) $\sqrt[3]{9x^2+21x-19} - x = 2$

65) $\sqrt{3x+3} = x - 5$

66) $\sqrt{2x+4} = 1 + \sqrt{x+2}$

Solve:

67) $\sqrt[4]{x+3} = -2$

68) $-3 \cdot |2x - 7| = 21$

69) $|3x - 8| = |3x + 6|$

70) $5 = 2 \cdot |7x - 5| - 9$

71) $4 = |3x + 2| + 4$

Solve and write the answer in interval notation:

72) $|5 - 6x| < 0$

73) $|3x - 6| \geq 12$

74) $\left|\frac{7}{8}x + \frac{3}{4}\right| < 2$

75) $x^3 - 2x^2 - 16x + 32 > 0$

76) $\frac{x}{x-5} \leq 2$

77) $|9 + 2x| > -3$

Solve by graphing (Be sure to identify any vertices):

78) $2x + 3y \leq 6$
$x > -3$

79) $y > -3x + 5$
$x - 2y < -3$

80) $y - 3x \geq -1$
$2x + y < 4$

81) $2x - 3y > 4$
$x + y \geq -3$
$x < 3$

Rationalize the denominator and simplify:

82) $\frac{\sqrt{3}-4}{\sqrt{3}+6}$

83) $\sqrt{\frac{7x}{22}}$

84) $\frac{-4\sqrt{5}}{2\sqrt{5}-\sqrt{3}}$

85) $\frac{\sqrt[3]{4}}{\sqrt[3]{5}}$

Rationalize the numerator and simplify:

86) $\frac{\sqrt{x}-2}{x-4}$

87) $\frac{\sqrt[3]{x}+2}{x+8}$ (hint: think Sum of Cubes)

Simplify each expression. Write your answers as radicals if possible:

88) $\sqrt{98}$

89) $\sqrt[4]{256a^4b^8}$

90) $(x^{5/6} \cdot y^{-2/3})^{1/5}$

91) $\dfrac{\sqrt[8]{(2x-7)^{15}}}{\sqrt[8]{(2x-7)^7}}$

92) $\sqrt[3]{8x^7 - 24x^6} - x^2\sqrt[3]{27x-81}$

93) $-6\sqrt{192} - 2\sqrt{18} + 5\sqrt{75}$

94) $\left(\sqrt{6x} - \sqrt{10y}\right)^2$

95) $\sqrt[5]{81x^4y^2} \cdot \sqrt[3]{9x^7y^4}$

96) $\sqrt{25x^2 - 90x + 81}$

97) $-\sqrt{x^5 - 9x^4} - x^2\sqrt{4x-36}$

98) $\left(\sqrt[3]{x} + \sqrt[3]{y}\right)\left(\sqrt[3]{x^2} - \sqrt[3]{xy} + \sqrt[3]{y^2}\right)$

99) $(2 + 3\sqrt{2})(2 - 3\sqrt{2})$

Simplify (write your answers with positive exponents):

100) $-7 + 2i - i^{274} + i^{885}$

101) $(-5 + 6i)(7 - 5i)$

102) $\dfrac{5-6i}{7+4i}$

103) $\sqrt{-144} - \sqrt{-81}$

Solve each equation (include all real and complex solutions):

105) $64x^3 - 1 = 0$

106) $3x^{1/2} - 11x^{1/4} - 4 = 0$

107) $4x^2 + 12 = -24$

108) $(x + \frac{5}{3})^2 - \frac{7}{3} = 0$

109) $4(x^2 - 2)^2 - 9(x^2 - 2) = -2$

110) $x^4 - 4x^3 + 125x - 500 = 0$

111) $w = \dfrac{km_1m_2}{d^2}$ for d $(d > 0)$

112) $S = 2\pi r^2 + 2\pi rh$ for r $(r \geq 0)$

Solve by completing the square:

113) $x^2 + 8x - 8 = 0$

114) $5x^2 - 3x + 12 = 0$

Use the discriminant to determine the number and type of solutions that exist:

115) $3x^2 - x - 50 = 0$

116) $\frac{1}{4}x^2 - 5x + 25 = 0$

Set-up the equation or inequality and solve the following:

117) A three-inch screw will be accepted if its length varies by less than ± 0.018 in. a) Write an inequality that represents this situation. b) Solve the inequality and interpret what the solution means.

118) The supply and demand functions for a certain commodity are $Q = 0.2p^2 + p + 50$ and $Q = -0.1p^2 + 90$ respectively where p is the price of the commodity and Q is the number of units. Find where these functions intersect.

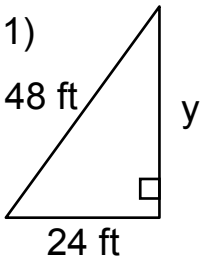
Find the vertex, the intercepts (if any), & graph of the following:

119) $y = (x - 2)^2 - \frac{15}{4}$

120) $f(x) = -2x^2 + 8x - 6$

Find the indicated lengths of the following:

121)



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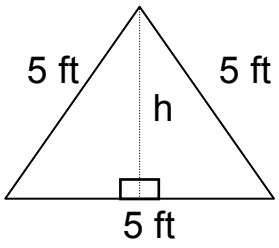

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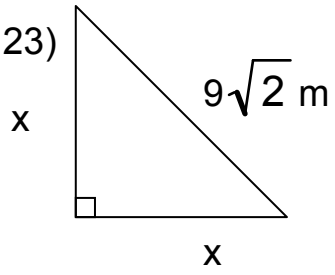
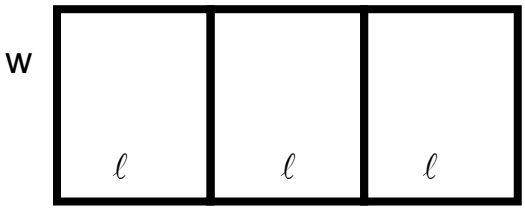


Set up the equation(s) and solve:

124) Find the diagonal of a square if each side is 15 inches long.

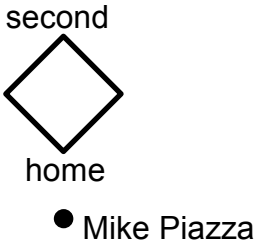
125) A rancher has 1200 feet of fencing to enclose three adjacent rectangular corrals. What dimensions should be used to maximize the area enclosed?



Set up the equation(s) and solve:

126) The red army is five miles south and six miles west of Warrington while the blue army is one mile north and eight miles east of Warrington.
   a) How far apart are the two armies?
   b) If the two armies start marching toward each other at the same rate, where will they meet relative to Warrington?

127) A baseball diamond is a square with each side equal to 90 feet. How far does Mike Piazza have to throw a baseball from ten feet behind home base to second to catch a runner trying to advance on a wild pitch?



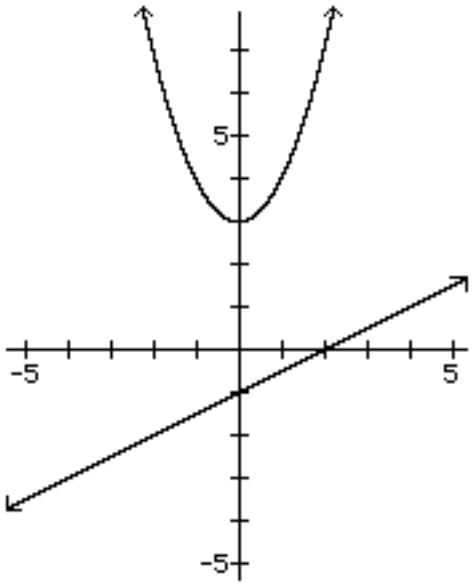
Solve the following inequalities:

128) $x^3 - 4x^2 - 9x + 36 > 0$

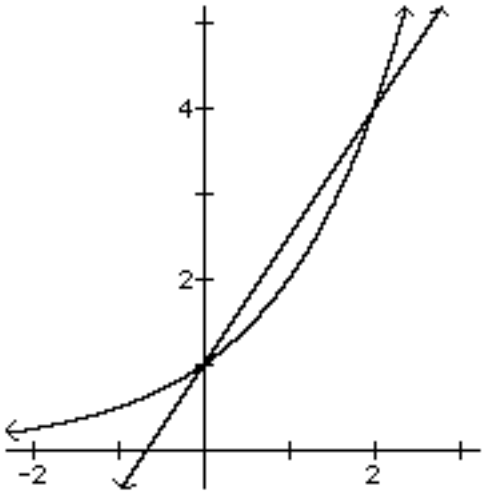
129) $\frac{x}{x-4} \leq 2$

Use the graphs below to solve the given system of equations:

130) $y = x^2 + 3$
$y = \frac{1}{2}x - 1$

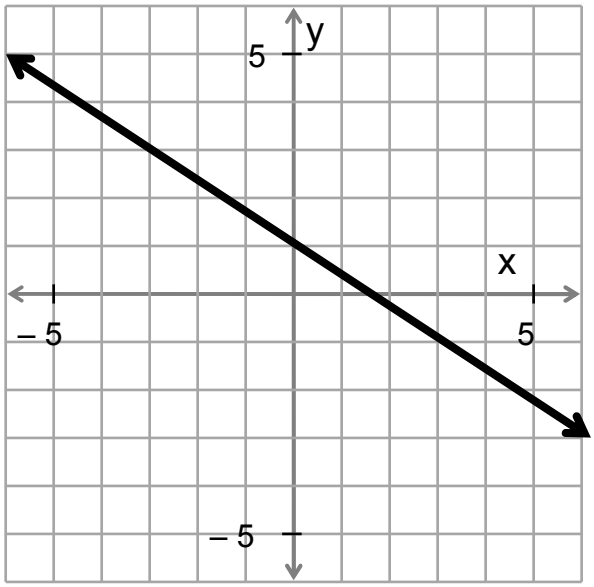


131) $y = 2^x$
$y = \frac{3}{2}x + 1$



Given the graph of f below, write the equation of the function in standard form:

132)



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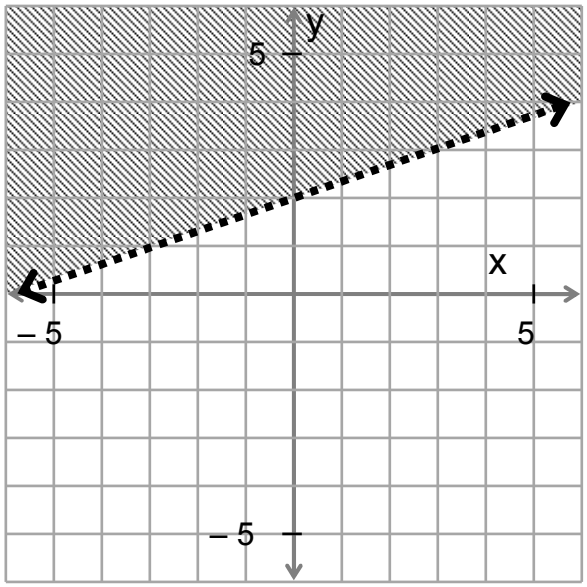

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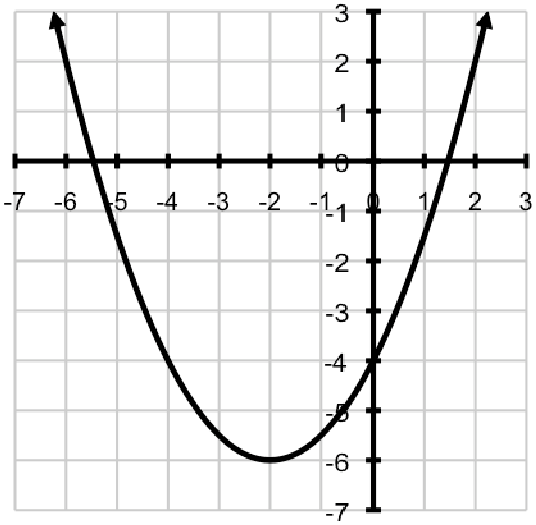

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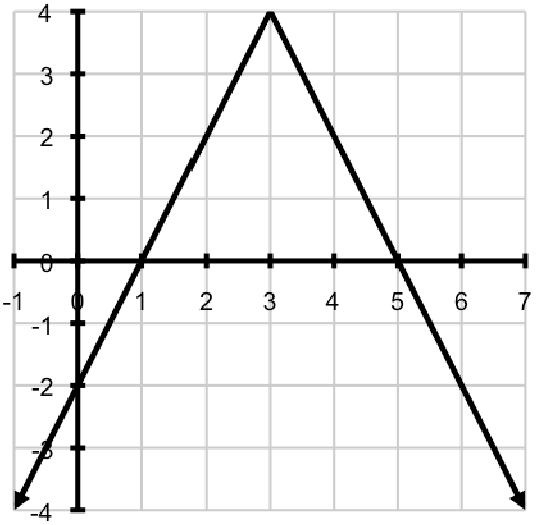


Sketch the graph the following:

136) $f(x) = 3 \left| x + 1 \right| - 2$

137) $f(x) = - \left| x - 2 \right| - 1$

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

139) $g(x) = -\frac{1}{x}$

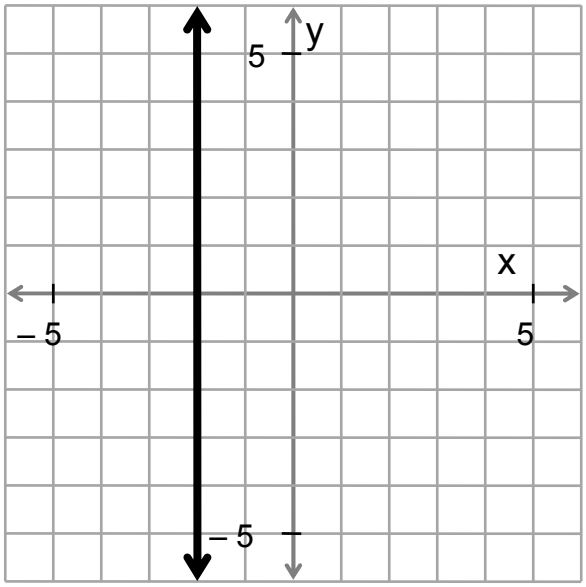
Answers:

1a) Yes, since every vertical line passes through at most one point. 1b) $[0, \infty)$
1c) $[-3, \infty)$ 1d) Yes 2a) No, since the vertical line $x = -2$ passes through two points
2b) $[-3, 0]$ 2c) $[-3, 3)$ 2d) Yes
3a) Yes, since every vertical line passes through at most one point. 3b) $(-\infty, \infty)$
3c) $(-\infty, \infty)$ 3d) No 4a) Yes, since every vertical line passes through at most one point.
4b) $(-\infty, \infty)$ 4c) $(-\infty, \infty)$ 4d) Yes 5) $[\frac{7}{4}, \infty)$

6) $(-\infty, -\frac{2}{3}) \cup (-\frac{2}{3}, 0) \cup (0, \frac{5}{2}) \cup (\frac{5}{2}, \infty)$ 7) $(-\infty, \infty)$ 8) $(-\infty, \frac{6}{5})$

9) $(-\infty, \infty)$ 10) $(-\infty, -4] \cup (-2, 2)$ 11) $(\frac{5}{3}, \infty)$ 12) $(-\infty, \infty)$

13)



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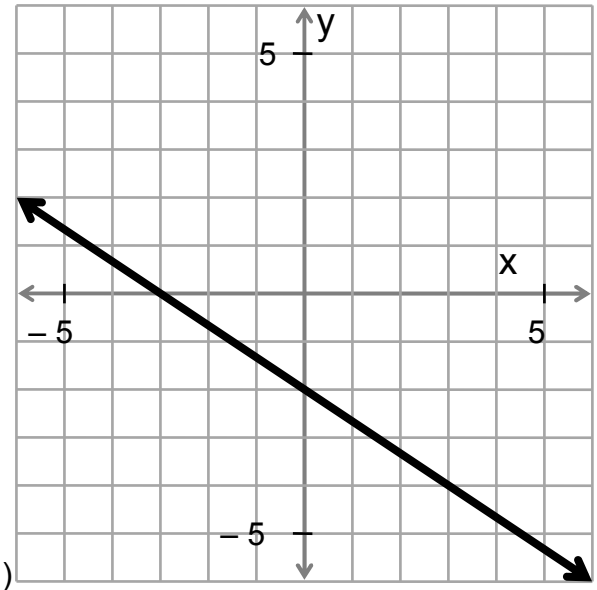

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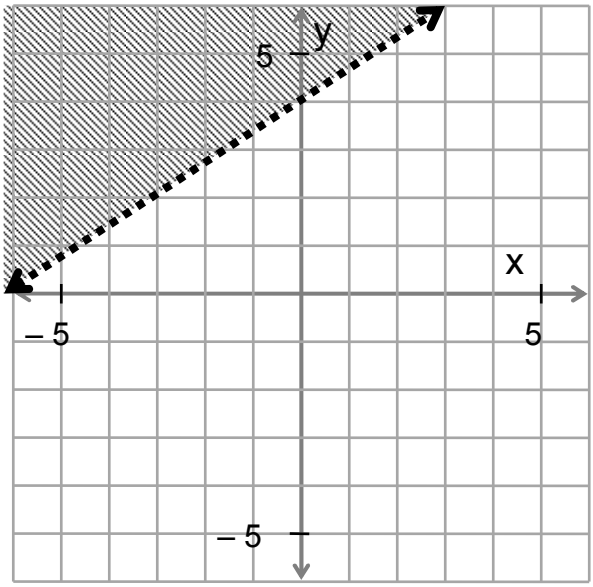

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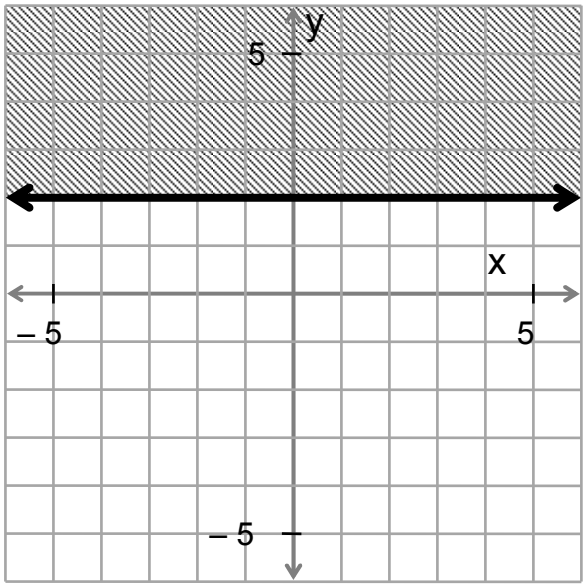


17a) 22 17b) – 45 18a) undefined 18b) 72 19) The point is (4, – 1).

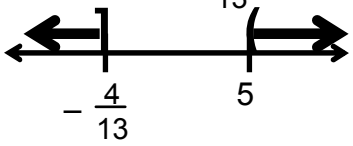
20) The point is (– 3, 6). 21) There is no solution. 22) The point is (2, 4).

23) $f(x) = \frac{1}{4}x + \frac{21}{4}$ 24) $f(x) = \frac{2}{3}x - 2$ 25) $y = \frac{3}{5}x + 1$ 26) $y = \frac{3}{7}x - \frac{55}{7}$

27a) 5 27b) 2 28a) undefined 28b) 4 29a) – 3 29b) {0, 4} 29c) (0, 1)

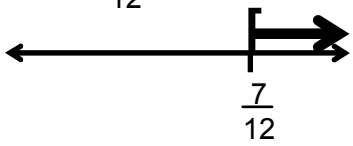
30) Linear 31) Neither 32) Quadratic 33) Neither 34) Constant

35) $(-\infty, -\frac{4}{13}] \cup (5, \infty)$



36) [1, 3)

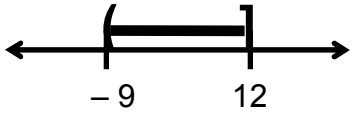
37) $[\frac{7}{12}, \infty)$



38) $(-\infty, \infty)$

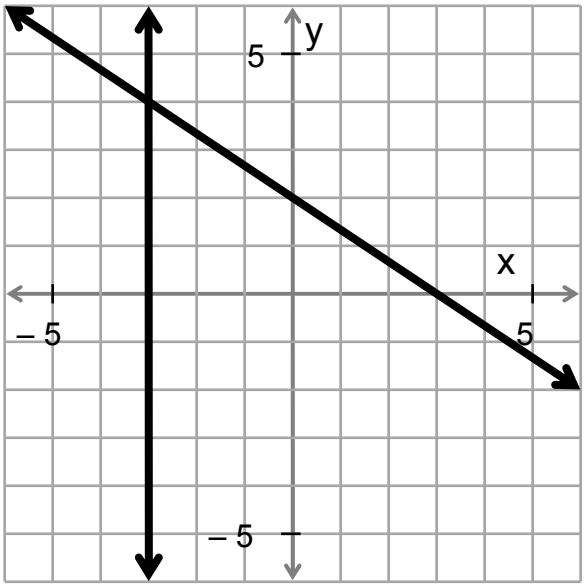
39) { }

40) (– 9, 15]



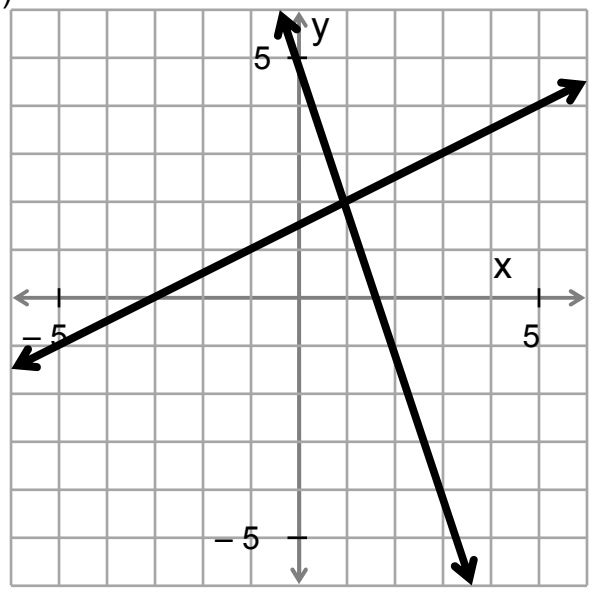
41) Consistent 42) Inconsistent 43) Dependent 44) Consistent

45)



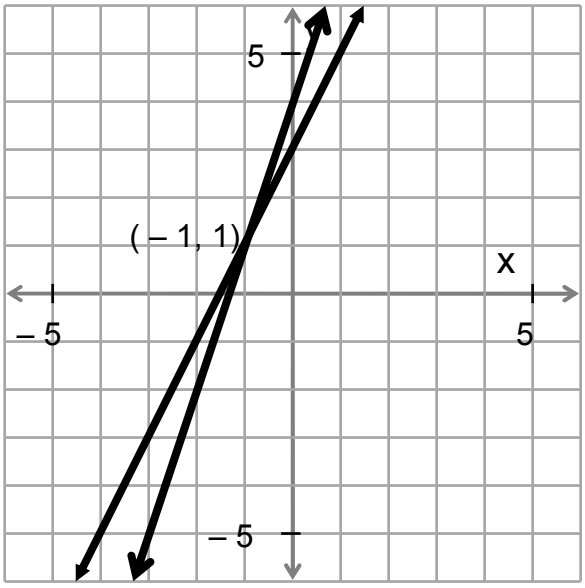
The solution is the point (– 3, 4).

46)



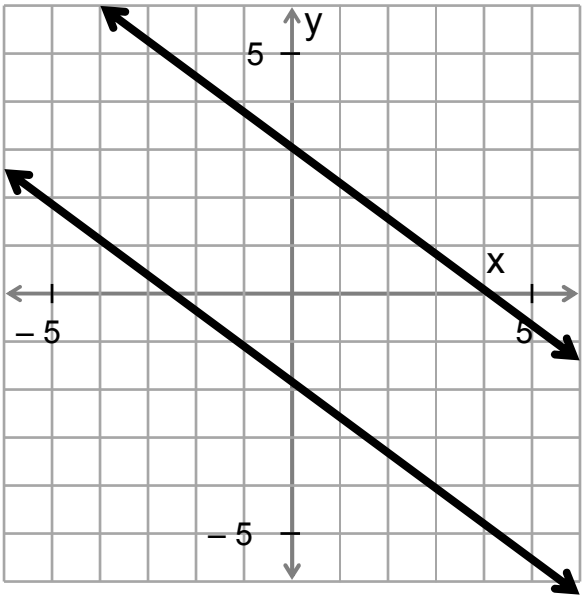
The solution is the point (1, 2).

47)



The solution is the point (– 1, 1).

48)



There is no solution.

49) Elroy's speed was 35 mph; Juanita drove 292.5 miles.

50) The measure of the angle and its complement are 74.5˚ and 115.5˚.

51) Ten child plates and thirty-five adult plates were sold.

52) $8,000 was invested at 7%, and $10,000 was invested at 9%.

53) Marigold bought eight pounds of chocolates and six pounds of hard candy.

54) Forty liters of the 30% solution is needed.

55) Elroy's speed was 35 mph; Juanita drove 292.5 miles.

56) The measure of the angle and its complement are 74.5˚ and 15.5˚ respectively.

57) Ten child plates and thirty-five adult plates were sold.

58) The numbers are – 5 and 5. 59) $\{\approx -3.7, -1, 1, \approx 3.7\}$

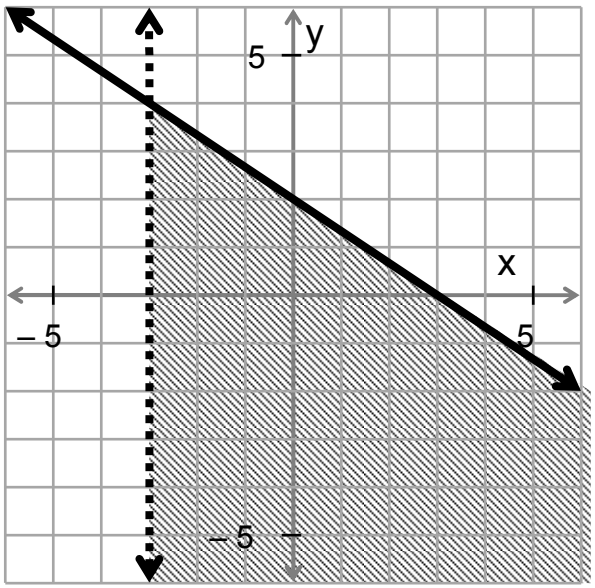
60) $\{\ \}$ 61) $\{\frac{2}{3}\}$ 62) $\left\{\frac{2-\sqrt{34}}{5}, \frac{2+\sqrt{34}}{5}\right\}$

63) $\{-4, -3, 3, 4\}$ 64) $\{-3, 3\}$ 65) $\{11\}$ 66) $\{1 + 2\sqrt{2}\}$ 67) $\{\ \}$

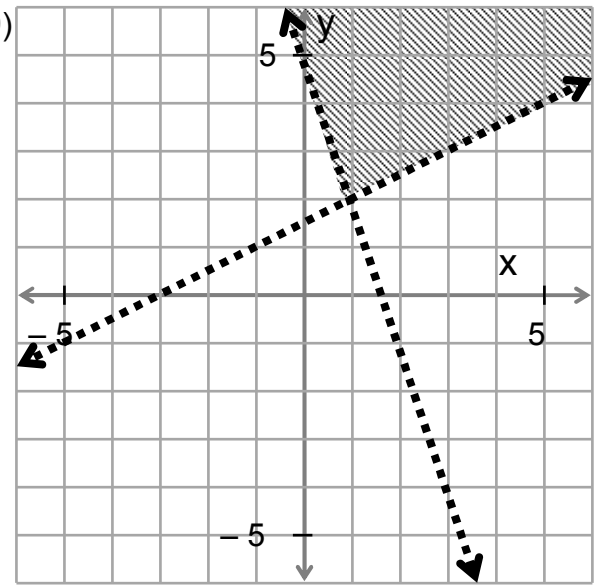
68) $\{\ \}$ 69) $\{\frac{1}{3}\}$ 70) $\{-\frac{2}{7}, \frac{12}{7}\}$ 71) $\{-\frac{2}{3}\}$ 72) $\{\ \}$

73) $(-\infty, -2] \cup [6, \infty)$ 74) $(-\frac{22}{7}, \frac{10}{7})$ 75) $(-4, 2) \cup (4, \infty)$

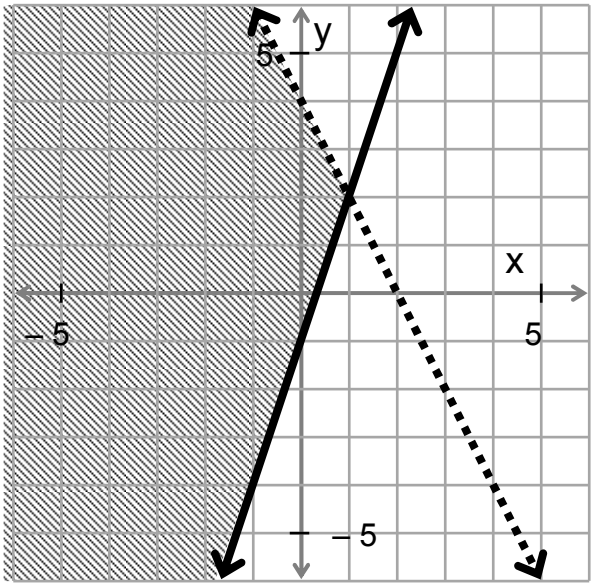
76) $(-\infty, 5) \cup [10, \infty)$ 77) $(-\infty, \infty)$

78) 

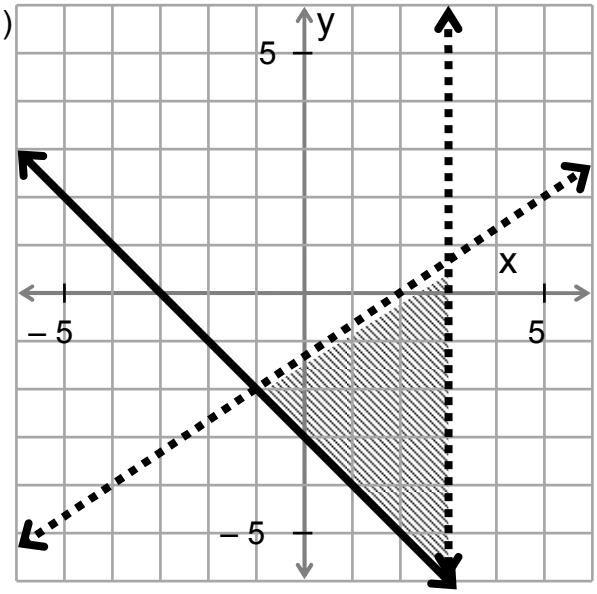
The vertex is the point (– 3, 4).

79) 

The vertex is the point (1, 2).

80) 

The vertex is the point (1, 2).

81) 

The vertices are the points (– 1, – 2), (3, – 6), & $(3, \frac{2}{3})$

82) $\frac{-27+10\sqrt{3}}{33}$ 83) $\frac{\sqrt{154x}}{22}$ 84) $\frac{-4\sqrt{15}-40}{17}$ 85) $\frac{\sqrt[3]{100}}{5}$

86) $\frac{1}{\sqrt{x}+2}$ 87) $\frac{1}{\sqrt[3]{x^2}-2\sqrt[3]{x}+4}$ 88) $7\sqrt{2}$ 89) $4|a|b^2$ 90) $30\sqrt{\frac{x^5}{y^4}}$

91) $|2x-7|$ 92) $-x^2\sqrt[3]{x-3}$ 93) $-23\sqrt{3}-6\sqrt{2}$

94) $6x+10y-4\sqrt{15xy}$ 95) $3x^3y\sqrt[15]{2187x^2y^{11}}$ 96) $|5x-9|$

97) $-3x^2\sqrt{x-9}$ 98) $x + y$ 99) -14 100) $-6 + 3i$ 101) $-5 + 67i$

102) $\frac{11}{65} - \frac{62}{65}i$ 103) $3i$ 104a) $(\frac{\sqrt{7}}{2}, 0)$ 104b) $\sqrt{23}$

105) $\{\frac{1}{4}, -\frac{1}{8} - \frac{\sqrt{3}}{8}i, -\frac{1}{8} + \frac{\sqrt{3}}{8}i\}$ 106) $\{256\}$ 107) $\{-3i, 3i\}$

108) $\{\frac{\check{S}5\ \check{S}\sqrt{21}}{3}, \frac{\check{S}5 + \sqrt{21}}{3}\}$ 109) $\{-2, -\frac{3}{2}, \frac{3}{2}, 2\}$

110) $\{-5, 4, \frac{5}{2} - \frac{5\sqrt{3}}{2}i, \frac{5}{2} + \frac{5\sqrt{3}}{2}i\}$ 111) $d = \sqrt{\frac{km_1m_2}{w}}$

112) $r = \frac{-\pi h + \sqrt{\pi^2h^2 + 2\pi S}}{2\pi}$ 113) $\{-4 + 2\sqrt{6}, -4 - 2\sqrt{6}\}$

114) $\{\frac{3}{10} - \frac{\sqrt{231}}{10}i, \frac{3}{10} + \frac{\sqrt{231}}{10}i\}$ 115) There are two real irrational solutions.

116) There is one real rational solution. 117a) $|L - 3| < 0.018$

117b) The screw will be accepted if the length is between 2.982 in and 3.018 in

118) Eighty units of the commodity are sold at \$10 per unit.

119) vertex: $(2, -\frac{15}{4})$

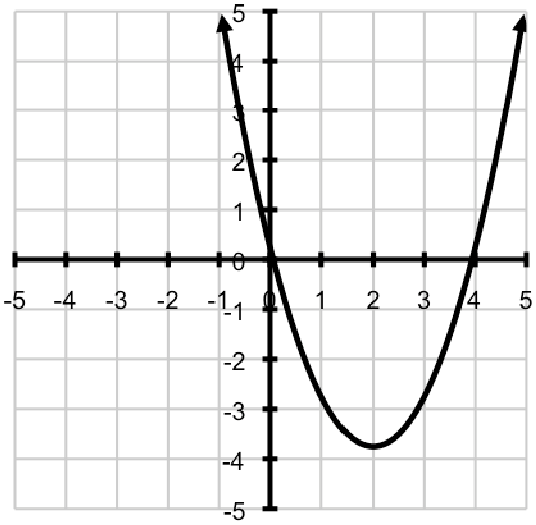
x - intercepts: $(\frac{4 - \sqrt{15}}{2}, 0)$ & $(\frac{4 + \sqrt{15}}{2}, 0)$

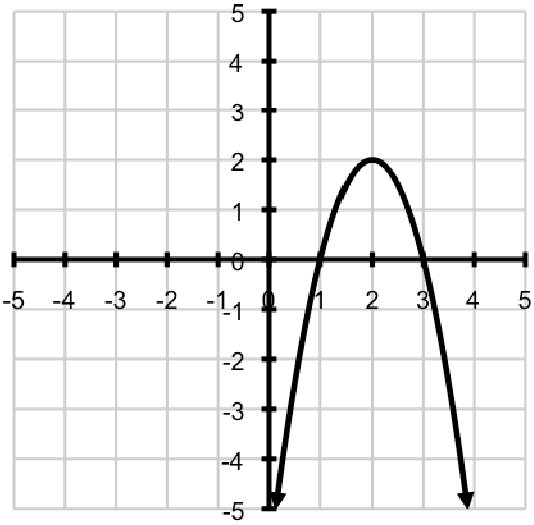
y - intercept: $(0, \frac{1}{4})$

120) vertex: (2, 2)

x - intercept: (3, 0) & (1, 0)

y - intercepts: (0, – 6)





121) $y = 24\sqrt{3}$ ft 122) $h = 2.5\sqrt{3}$ ft 123) $x = 9$ m 124) $15\sqrt{2}$ inches

125) The length should be 100 ft and the width 150 ft.

126a) The armies are $2\sqrt{58}$ miles (or ≈ 15.23 miles) apart.

126b) They will be 2 miles south and 1 mile east or Warrington when they meet.

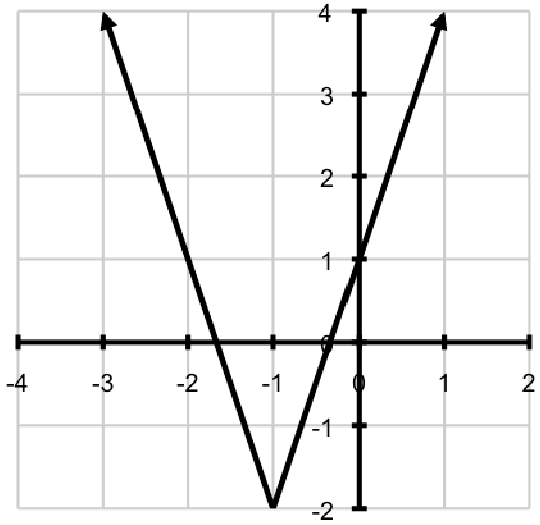
127) He has to throw the ball $(10 + 90\sqrt{2})$ ft which is ≈ 137.28 ft

128) $(-3, 3) \cup (4, \infty)$ 129) $(-\infty, 4) \cup [8, \infty)$ 130) No solution

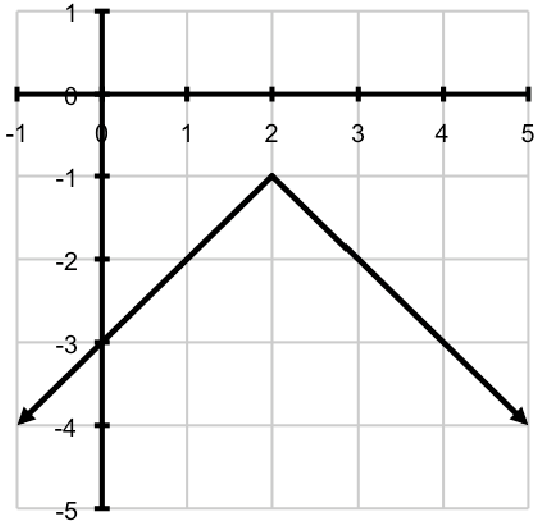
131) The solutions are (0, 1) and (2, 4). 132) $f(x) = -\frac{2}{3}x + 1$ 133) $f(x) > \frac{1}{2}x + 2$

134) $f(x) = \frac{1}{2}x^2 + 2x - 4$ 135) $f(x) = -2\left|x - 3\right| + 4$

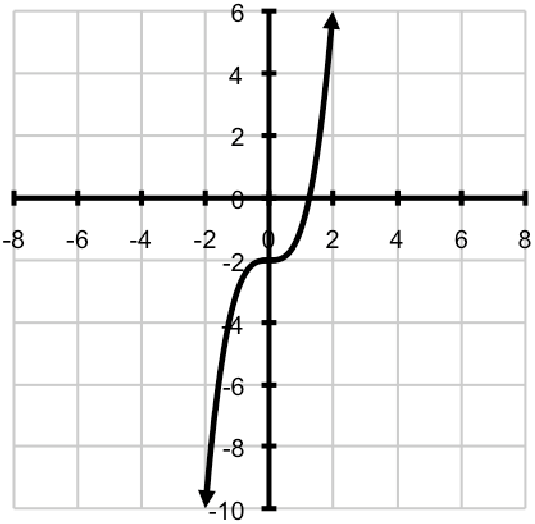
136)



137)



138)



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