

**1** Let the function  $f$  be defined by the equation  $y = f(x)$ , where  $x$  and  $f(x)$  are real numbers. Find the domain of the function

$$f(x) = \sqrt{25x^2 - 11}$$

**2** Let the function  $f$  be defined by the equation  $y = f(x)$ , where  $x$  and  $f(x)$  are real numbers. Find the range of the function

$$f(x) = \frac{10x + 4}{x - 24}$$

**3** Let the function  $f$  be defined by the equation  $y = f(x)$ , where  $x$  and  $f(x)$  are real numbers. Find the domain of the function

$$f(x) = \frac{14x + 35}{x - 25}$$

**4** Let the function  $f$  be defined by  $y = f(x)$ , where  $x$  and  $f(x)$  are real numbers. Find  $f(8)$ .

$$f(x) = 30x - 20$$

**5** Let the function  $f$  be defined by  $y = f(x)$ , where  $x$  and  $f(x)$  are real numbers. Find  $f(7)$ .

$$f(x) = 91 - 44x^2$$

**6** Let the function  $f$  be defined by  $y = f(x)$ , where  $x$  and  $f(x)$  are real numbers. Find  $f(2)$ .

$$f(x) = \frac{17}{x^2 + 15}$$

**7** Let the function  $f$  be defined by  $y = f(x)$ , where  $x$  and  $f(x)$  are real numbers. Find  $f(3)$ .

$$f(x) = \sqrt{2x^2 + 18}$$

**8** Evaluate the difference quotient for the function.

$$f(x) = 6x - 5$$

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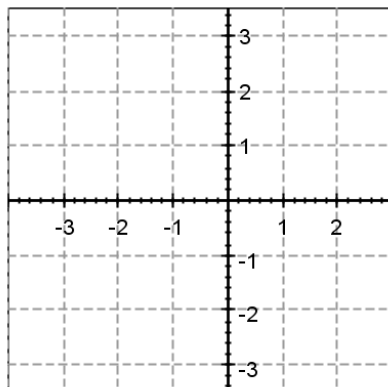
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9 Evaluate the difference quotient for the function.

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

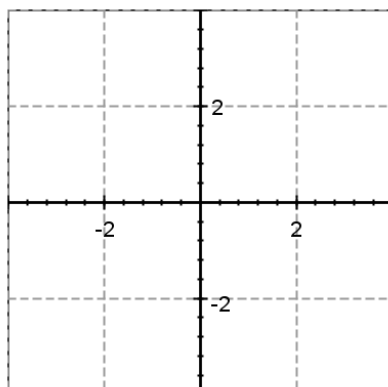
10 Graph the function.

$$f(x) = 3x + 2$$



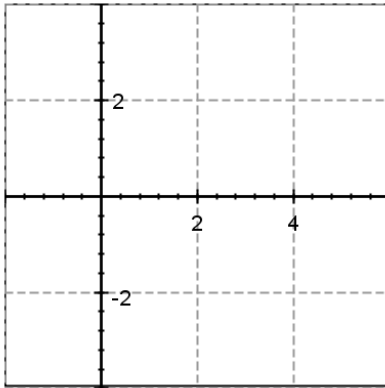
11 Graph the function.

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



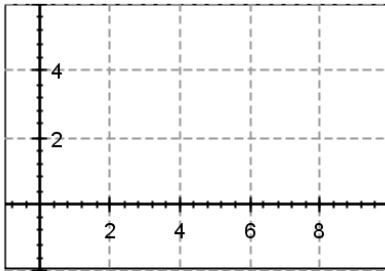
12 Graph the function.

$$f(x) = |x - 2|$$



13 Graph the function.

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



14 Give the domain of the function.

$$f(x) = \sqrt{6x - 6}$$

15 Give the range of the function.

$$f(x) = \sqrt[3]{4x - 6}$$

16 Give the domain of the function.

$$f(x) = -\sqrt[3]{17x + 26}$$

17 The velocity of a falling object is a linear function of the time  $t$  it has been falling. If  $v = 18$  when  $t = 0$  and  $v = 130$  when  $t = 16$ , express  $v$  as a function of  $t$ .

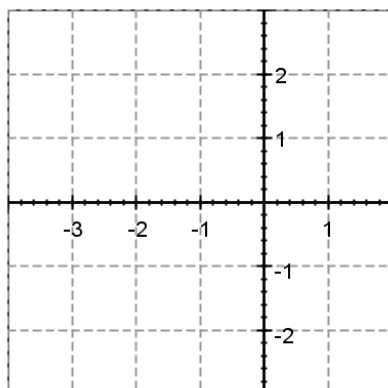
18 The amount  $A$  of money on deposit for  $t$  years in an account earning simple interest is a linear function of  $t$ . Express that function as an equation if  $A = \$96$  when  $t = 3$  and  $A = \$116$  when  $t = 5$ .

19 Find the vertex of the parabolic graph of the equation.

$$y = 2(x - 3)^2 + 7$$

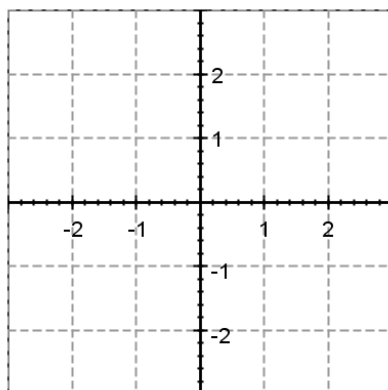
20 Graph the quadratic function.

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



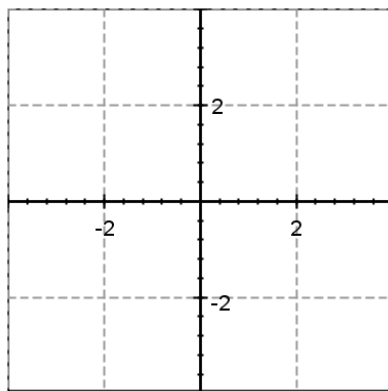
21 Graph the quadratic function.

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



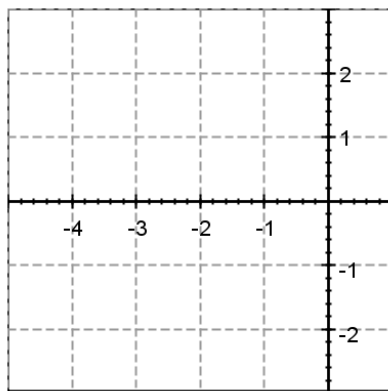
22 Graph the quadratic function.

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



23 Graph the quadratic function.

$$f(x) = -x^2 - 4x + 1$$



24 Find the vertex of the parabola.

$$y = -8x^2 + 4$$

25 Find the vertex of the parabola.

$$y = x^2 + 2x + 1$$

26 Find the vertex of the parabola.

$$y = x^2 - 18x + 81$$

27 Find the vertex of the parabola.

$$y = -x^2 + 12x - 32$$

28 Find the vertex of the parabola.

$$y = 4x^2 + 12x + 14$$

29 An object is thrown from the origin of a coordinate system with the  $x$ -axis along the ground and the  $y$ -axis vertical. Its path, or trajectory, is given by the equation  $y = 296x - 16x^2$ . Find the object's maximum height. Enter your answer as a number without units.

30 The rectangular garden in the illustration has a width of  $x$  and a perimeter of 100 feet. Find  $x$  such that the area of the rectangle is maximum.

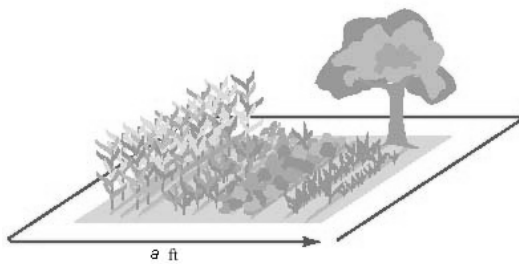
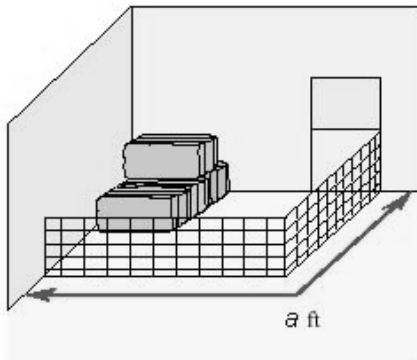


ILLUSTRATION :

$$a = 100$$

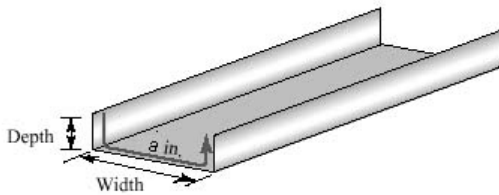
- 31 A farmer wants to partition a rectangular feed storage area in a corner of his barn. The barn walls form two sides of the stall, and the farmer has 34 feet of partition for the remaining two sides.



$$a = 34$$

What dimensions will maximize the area of the partition?

- 32 A 16-inch-wide sheet of metal is to be bent into a rectangular trough with the cross section.



$$a = 16$$

Find the dimensions that will maximize the amount of water the trough can hold. That is, find the dimensions that will maximize the cross-sectional area.

- 33 A wholesaler of appliances finds that she can sell  $(1200 - 4p)$  television sets each week when the price is  $p$  dollars. What price will maximize revenue?

- 34 A 270-room hotel is two-thirds filled when the nightly room rate is \$90. Experience has shown that each \$15 increase in cost results in 30 fewer occupied rooms. Find the nightly rate that will maximize income.

35 At a time  $t$  seconds after an object is tossed vertically upward, it reaches a height  $s$  in feet given by the equation:

$$s = 100t - 16t^2$$

How many seconds does it take the object to reach its maximum height?

36 At a time  $t$  seconds after an object is tossed vertically upward, it reaches a height  $s$  in feet given by the equation:

$$s = 224t - 16t^2$$

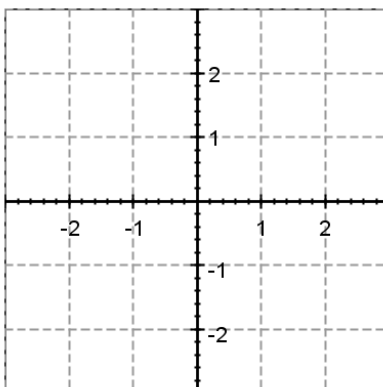
What is the maximum height reached by the object?

37 What is degree of the function

$$y = f(x) = x^7 - 4$$

38 Graph the polynomial function

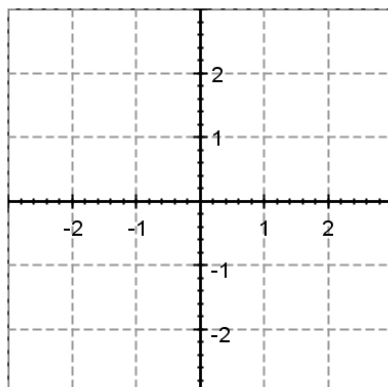
$$f(x) = x^3 + x^2$$





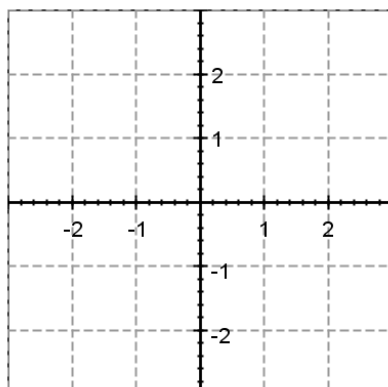
39 Graph the polynomial function

$$y = -x^3 + 1$$

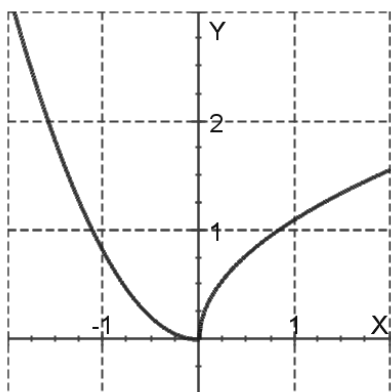


40 Graph the polynomial function

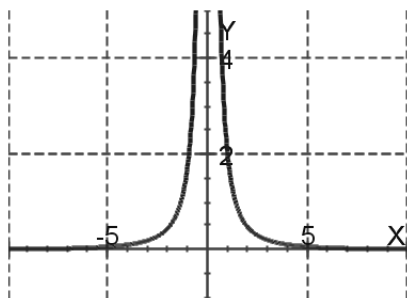
$$f(x) = x^4 - 2x^2 + 1$$



41 Tell where the function is increasing.



42 Tell where the function is decreasing.

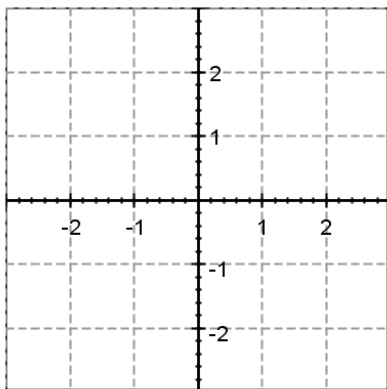


43 Tell where the function is increasing.

$$y = 49 - x^2$$

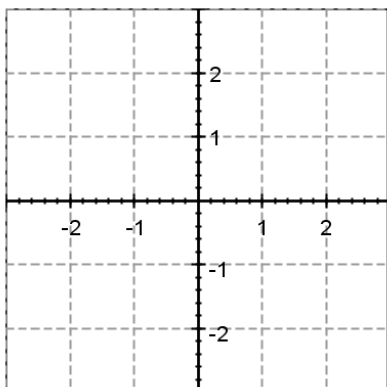
44 Graph the piecewise-defined function.

$$y = f(x) = \begin{cases} x + 2 & \text{if } x < 0 \\ 2 & \text{if } x \geq 0 \end{cases}$$



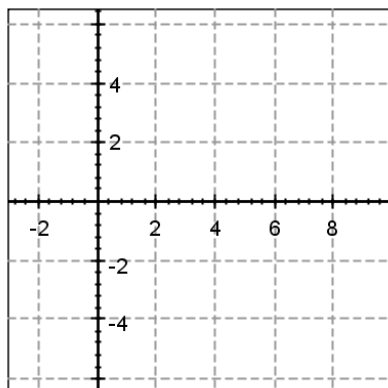
45 Graph the piecewise-defined function.

$$y = f(x) = \begin{cases} -x & \text{if } x < 0 \\ x^2 & \text{if } x \geq 0 \end{cases}$$



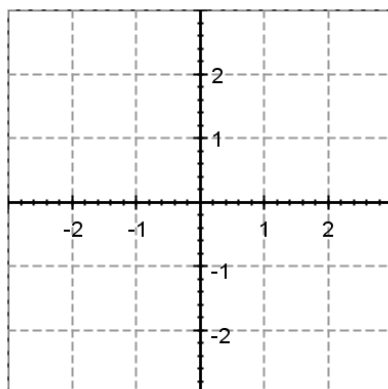
46 Graph the piecewise-defined function.

$$y = f(x) = \begin{cases} |x| & \text{if } x < 0 \\ \sqrt{x} & \text{if } x \geq 0 \end{cases}$$



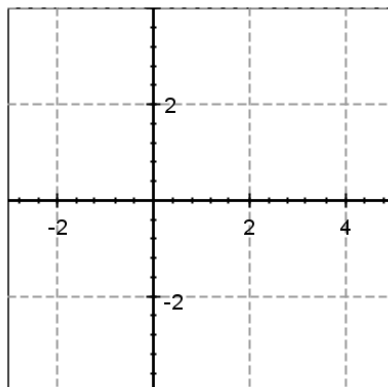
47 Graph the piecewise-defined function.

$$y = f(x) = \begin{cases} 0 & \text{if } x < 0 \\ x^2 & \text{if } 0 \leq x \leq 2 \\ 4 - 2x & \text{if } x > 2 \end{cases}$$



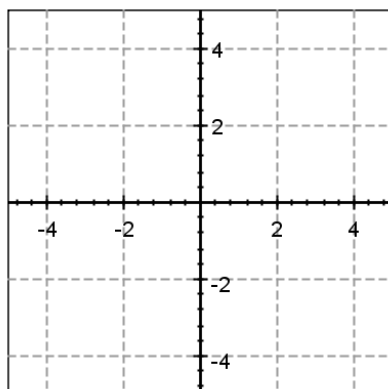
48 Graph the piecewise-defined function.

$$y = f(x) = \begin{cases} 2 & \text{if } x < 0 \\ 2 - x & \text{if } 0 \leq x < 2 \\ x & \text{if } x \geq 2 \end{cases}$$



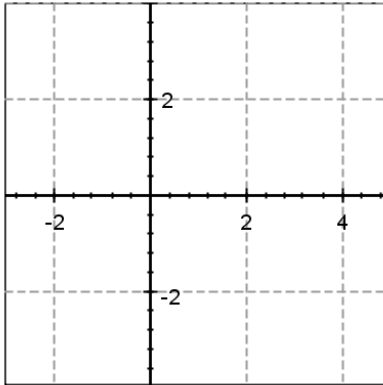
49 Graph the function.

$$y = \lceil 2x \rceil$$

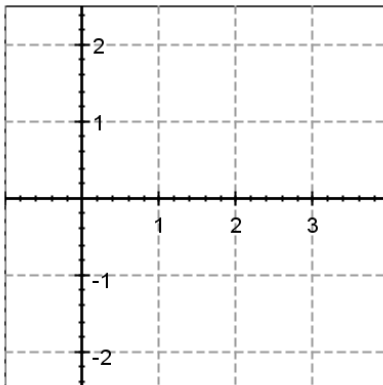


50 Graph the function.

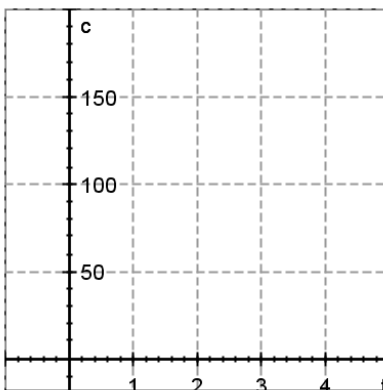
$$y = \lfloor x - 1 \rfloor$$



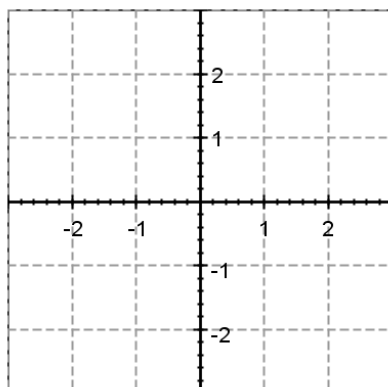
51 A taxicab company charges \$3 for a trip up to 1 mile, and \$2 for every extra mile (or portion of a mile). Graph the ordered pairs  $(m, c)$ , where  $m$  represents the miles traveled and  $c$  represents the cost.



52 A plumber charges \$30, plus \$40 per hour (or fraction of an hour), to install a new bathtub. Graph the points  $(t, c)$ , where  $t$  is the time it takes to do the job and  $c$  is the cost.

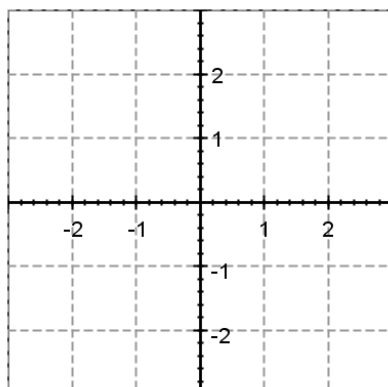


- 53 Graph the function defined by  $y = \frac{|x|}{x}$ .



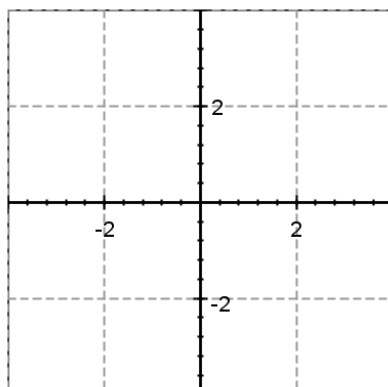
- 54 Graph the function.

$$y = x + |x|$$



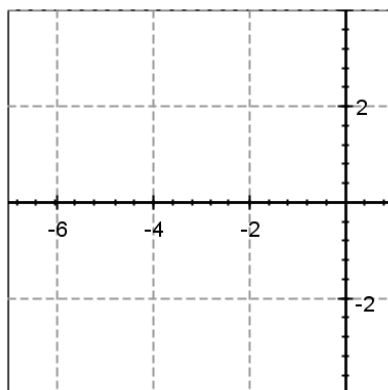
- 55 Graph the function

$$g(x) = x^2 - 2$$



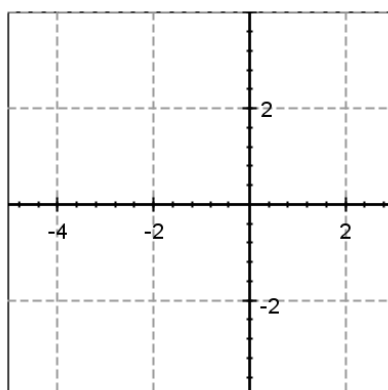
56 Graph the function

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



57 Graph the function

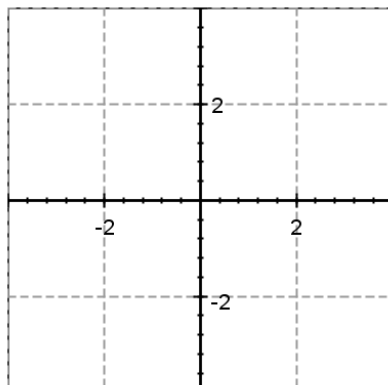
$$h(x) = (x + 1)^2 + 2$$





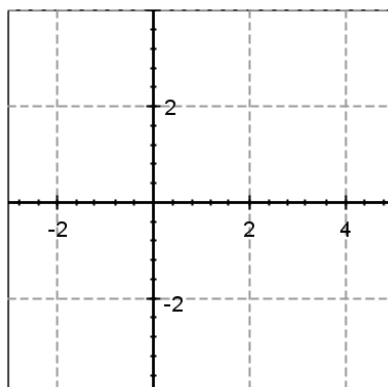
58 Graph the function

$$h(x) = \left(x + \frac{1}{2}\right)^2 - \frac{1}{2}$$



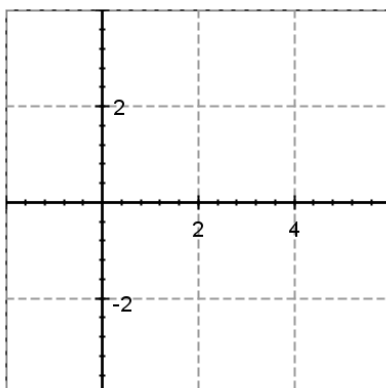
59 Graph the function

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

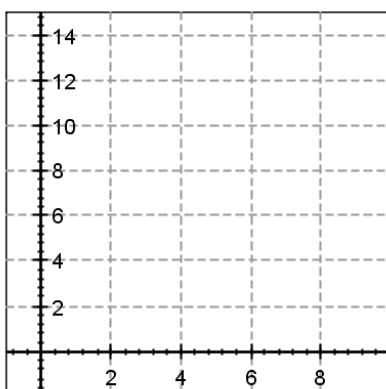


**60** Graph the function

$$h(x) = (x - 2)^3 - 3$$

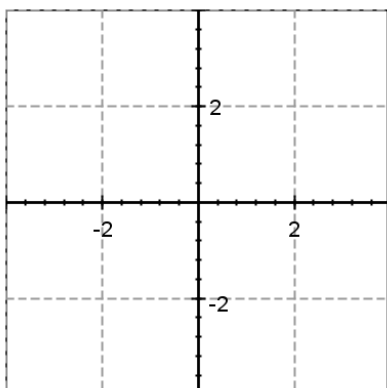
**61** Graph the function

$$y - 7 = (x - 5)^3$$

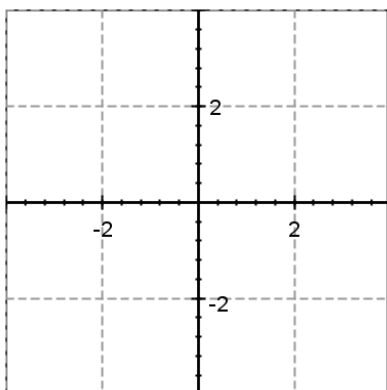


**62** Graph the function

$$h(x) = -x^3$$

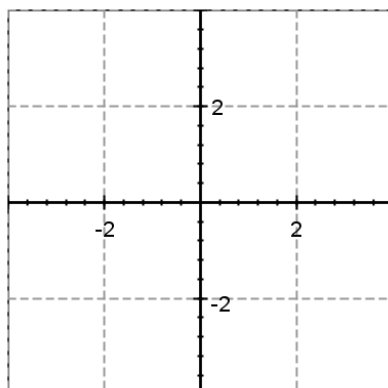
**63** Graph the function

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

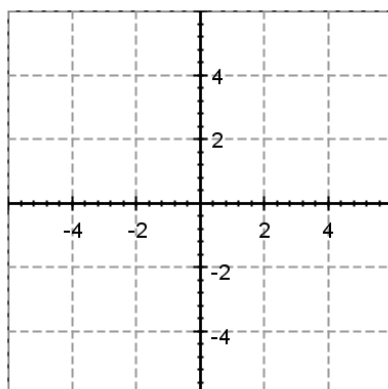


**64** Graph the function

$$f(x) = 2x^2$$

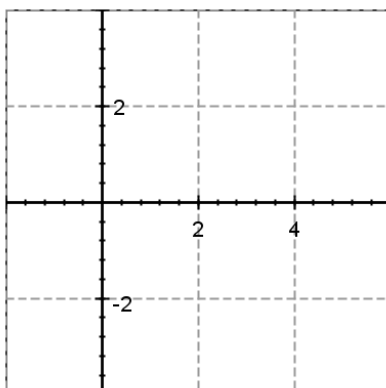
**65** Graph the function

$$f(x) = \left(\frac{1}{2}x\right)^3$$



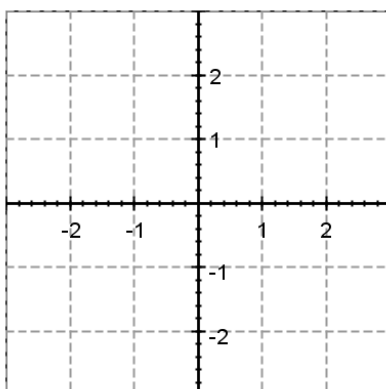
66 Graph the equation

$$f(x) = |x - 2| + 1$$



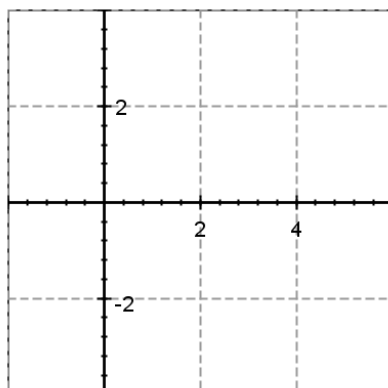
67 Graph the equation

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

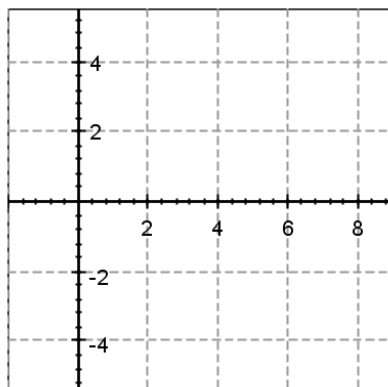


**68** Graph the equation

$$h(x) = \sqrt{x-2} + 1, \quad x \geq 2$$

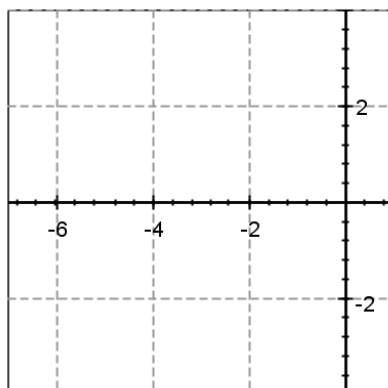
**69** Graph the equation

$$f(x) = 2\sqrt{x+3}, \quad x \geq 0$$



**70** Graph the equation

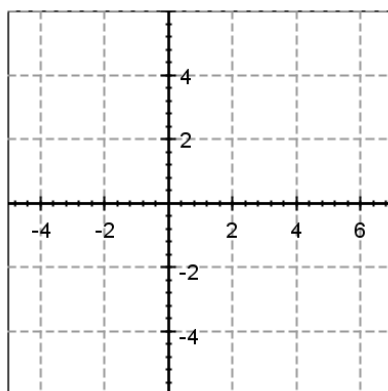
$$f(x) = -2|x + 3|$$

**71** Find y-intercept of the function

$$f(x) = \frac{5x - 5}{x - 1}$$

**72** Graph the function

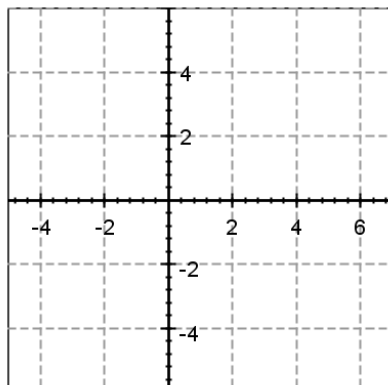
$$f(x) = \frac{3x + 2}{x^2 - 4}$$

**73** Find x-intercepts of the function

$$g(x) = \frac{x^2 - 9}{x^2 - 7}$$

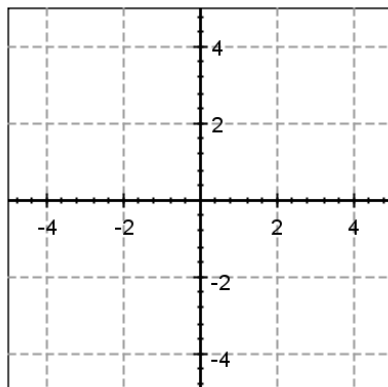
74 Graph the function

$$f(x) = \frac{x^2 - x - 2}{x^2 - 4x + 3}$$



75 Graph the function

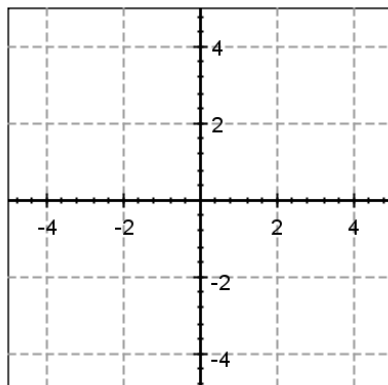
$$f(x) = \frac{x^2 + 2x - 3}{x^3 - 4x}$$





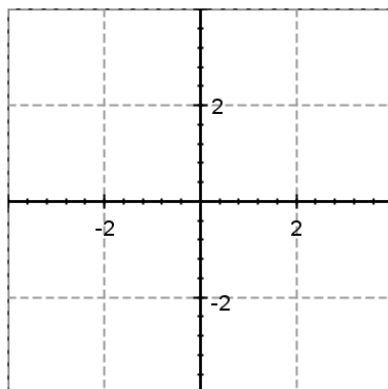
76 Graph the function

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



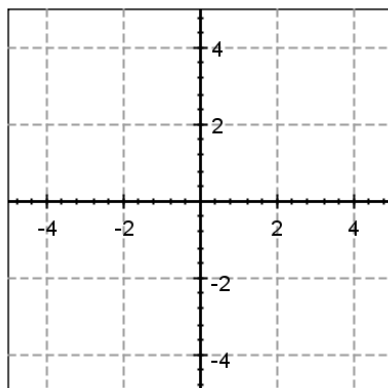
77 Graph the function

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



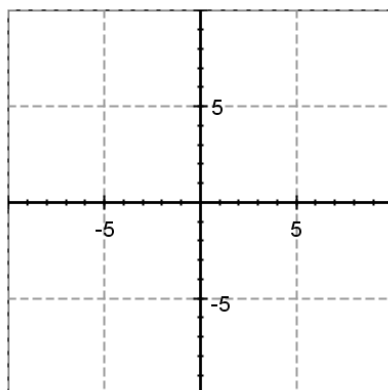
78 Graph the function

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



79 Graph the function

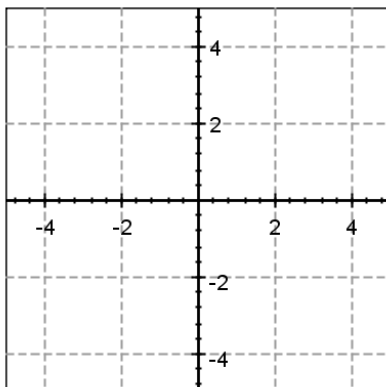
$$h(x) = \frac{x^2 - 2x - 8}{x - 1}$$



**80** Graph the function

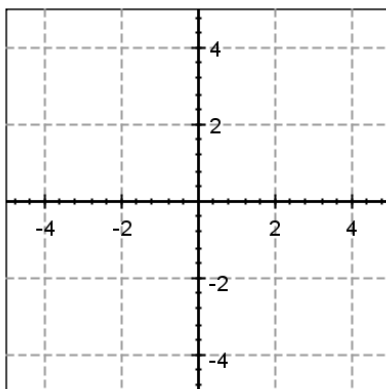
$$f(x) = \frac{x^2}{x}$$

Note that the numerator and denominator of the fraction share a common factor.

**81** Graph the function

$$f(x) = \frac{x^3 + x}{x}$$

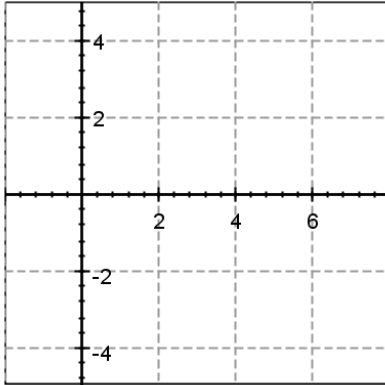
Note that the numerator and denominator of the fraction share a common factor.



**82** Graph the function

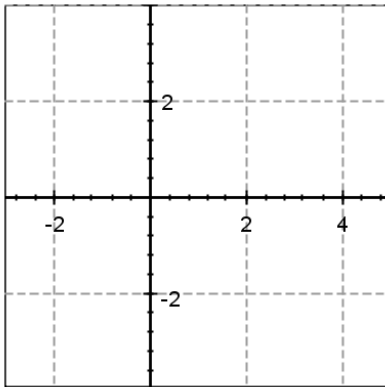
$$f(x) = \frac{x^2 - 2x + 1}{x - 1}$$

Note that the numerator and denominator of the fraction share a common factor.

**83** Graph the function

$$f(x) = \frac{x^3 - 1}{x - 1}$$

Note that the numerator and denominator of the fraction share a common factor.



**84** A service club wants to publish a directory of its members. An investigation shows that the cost of typesetting and photography will be \$600.00, and the cost of printing each directory will be \$1.00. Find the mean cost per directory if 300 directories are printed.

**85** An electric company charges \$7.50 per month plus \$0.07 for each kilowatt hour (kwh) of electricity used. Find a linear function  $f(n)$  that gives the total cost of  $n$  kwh of electricity.

**86** An electric company charges \$6.50 per month plus \$0.11 for each kilowatt hour (kwh) of electricity used. Find a rational function  $f(n)$  that gives the average cost per kwh when using  $n$  kwh.

87 Let  $f(x) = 2x - 1$ ,  $g(x) = 3x - 2$ . Find the domain of the function.

$$(f - g)(x)$$

88 Let  $f(x) = 2x + 1$ ,  $g(x) = 3x - 2$ . Find the function.

$$(f - g)(x)$$

89 Let  $f(x) = x^2 - 1$ ,  $g(x) = 3x - 2$ . Find the value of the function.

$$(f + g)(5)$$

90 Let  $f(x) = 2x - 5$ ,  $g(x) = 5x - 2$ . Find the value of the function.

$$(g \circ g)(-4)$$

91 Let  $f(x) = 3x^2 - 2$ ,  $g(x) = 4x + 4$ . Find the value of the function.

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

92 Let  $f(x) = 3x$ ,  $g(x) = x + 1$ . Find the composite function.

$$(f \circ g)(x)$$

93 Let  $f(x) = x^2$ ,  $g(x) = 2x$ . Find the composite function  $(g \circ g)(x)$ .

94 Let  $f(x) = \sqrt{x}$ ,  $g(x) = x + 1$ . Find the composite function.

$$(f \circ g)(x)$$

95 Let  $f(x) = \sqrt{x}$ ,  $g(x) = x + 1$ . Find the domain of the composite function.

$$(g \circ f)(x)$$

Please express the answer in interval notation.

96 Let  $f(x) = \sqrt{x + 1}$ ,  $g(x) = x^2 - 1$ . Find the domain of the composite function.

$$(g \circ g)(x)$$

Please express the answer in interval notation.

97 Let  $f(x) = \sqrt{x + 1}$ ,  $g(x) = x^2 - 1$ . Find the composite function.

$$(g \circ f)(x)$$

98 Let  $f(x) = \frac{1}{x - 1}$ ,  $g(x) = \frac{1}{x - 2}$ . Find the domain of the composite function.

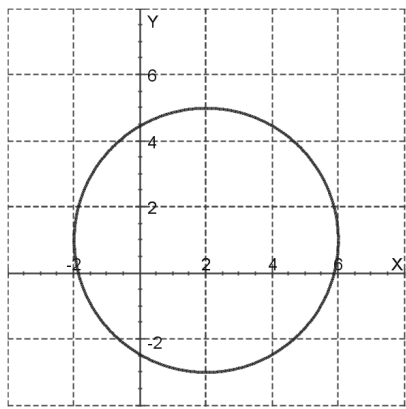
$$(g \circ g)(x)$$

- 99** When the temperature of a pot in a kiln is  $1607^{\circ}\text{F}$ , an artist turns off the heat and leaves the pot to cool at a controlled rate of  $99^{\circ}\text{F}$  per hour. Express the temperature of the pot in degrees Celsius as a function of the time  $t$  (in hours) since the kiln was turned off.

- 100** Let  $g(x) = \frac{4x}{3x - 1}$ . Find the composite function.

$$(g \circ g)(x)$$

- 101** Use the horizontal line test to determine whether the graph represents a one-to-one function.



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

$$y = 5x$$

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

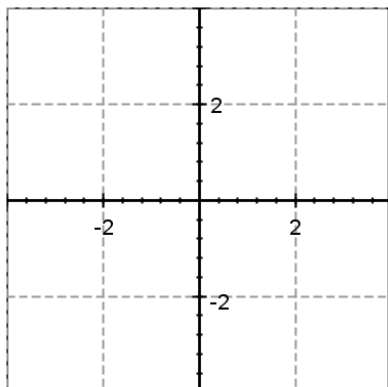
$$y = 9x + 2$$

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

$$y = \frac{1}{7x}$$

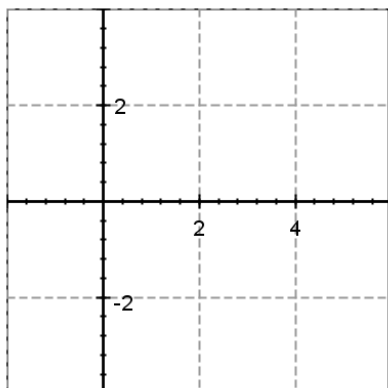
**105** Find the inverse of this one-to-one function and graph both the function and its inverse on the same set of coordinate axes.

$$y = 2x$$



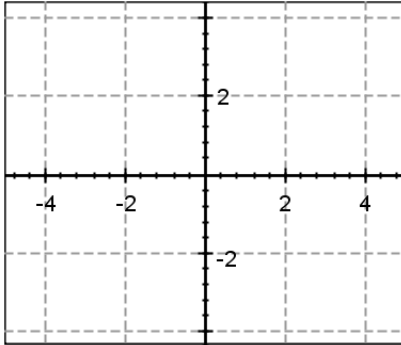
**106** Find the inverse of this one-to-one function and graph both the function and its inverse on the same set of coordinate axes.

$$2x + y = 4$$



**107** Find the inverse of the one-to-one function and graph both the function and its inverse on the same set of coordinate axes.

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



**108** The function  $f(x) = x^2 - 8$  is one-to-one on the domain  $x \leq 0$ . Find  $f^{-1}(x)$ .

**109** The function  $f(x) = \frac{10}{x^2}$  is one-to-one on the domain  $x > 0$ . Find  $f^{-1}(x)$ .

**110** The function  $f(x) = \sqrt{x^2 - 6}$  is one-to-one on the domain  $x \leq -\sqrt{6}$ . Find  $f^{-1}(x)$ .

**111** Find the range of the function  $f(x) = \frac{7x}{x-6}$  by finding the domain of  $f^{-1}(x)$ .

**112** Find the range of the function  $f(x) = \frac{7}{x} - 3$  by finding the domain of  $f^{-1}(x)$ .

**113** A pizzeria charges \$11.00 plus \$0.60 per topping for a large pizza. Find a linear function that expresses the cost  $y$  of a large pizza in terms of the number of toppings  $x$ .

**114** A pizzeria charges \$8.50 plus \$0.65 per topping for a large pizza. Find the cost of a pizza that has 2 toppings.

**115** A phone company charges \$10.00 per month plus \$0.02 per call. Find a rational function that expresses the average cost  $y$  of a call in a month when  $x$  calls were made.



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**116** A phone company charges \$11.90 per month plus \$0.04 per call. How many calls can be made for an average cost of \$0.14 per call?

**ANSWER KEY**

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1.  $\left(-\infty, -\frac{\sqrt{11}}{5}\right] \cup \left[\frac{\sqrt{11}}{5}, \infty\right)$

x in  $(-\infty, -\sqrt{11.000000000000000000/25.00000000000000000}) \cup [\sqrt{11.00000000000000000}/25.00000000000000000, +\infty)$

2.  $(-\infty, 10) \cup (10, \infty)$

3.  $(-\infty, 25) \cup (25, \infty)$

4. 220

4.  $f(8) = 220$

5. -2065

5.  $f(7) = -2065$

6.  $\frac{17}{19}$

6.  $\frac{17}{19}$

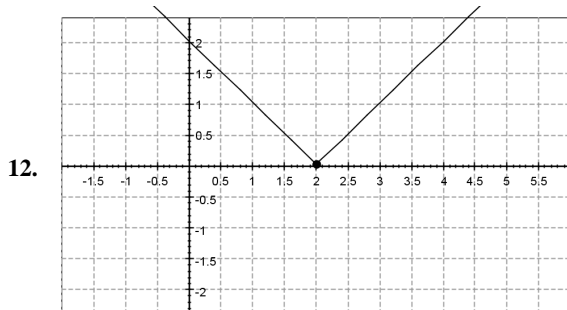
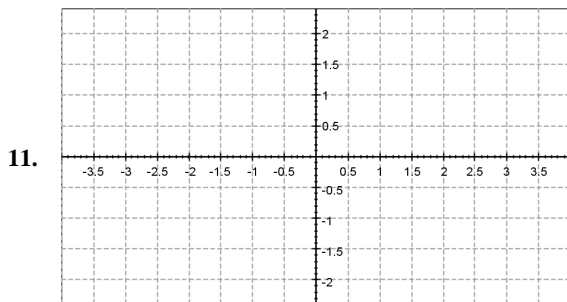
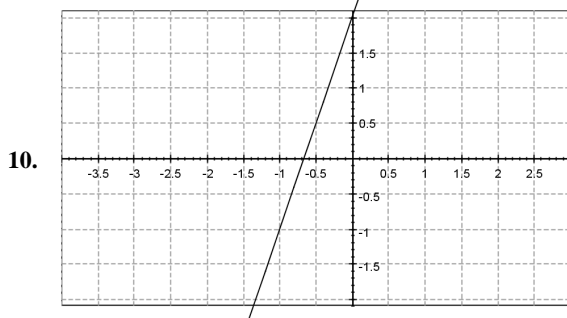
6.  $f(2) = \frac{17}{19}$

7. 6

7.  $f(3) = 6$

8. 6

9.  $14x + 7h$



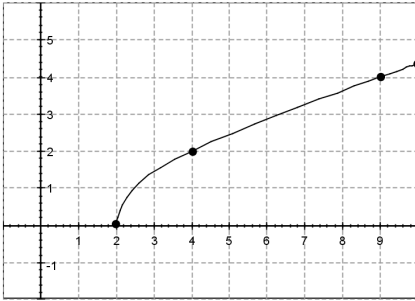
ANSWER KEY

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13.



14.  $[1, \infty)$   
 $x \in [1.0000, \infty)$

15.  $(-\infty, \infty)$

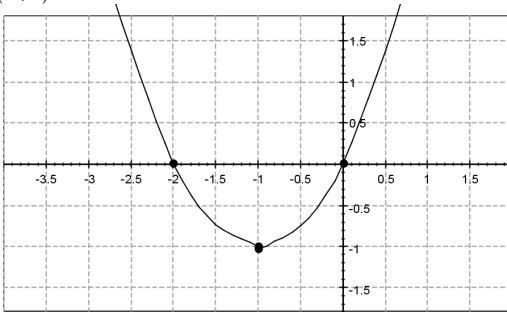
16.  $(-\infty, \infty)$   
 $x \in (-\infty, \infty)$

17.  $v = 7t + 18$   
 $v(t) = 7t + 18$

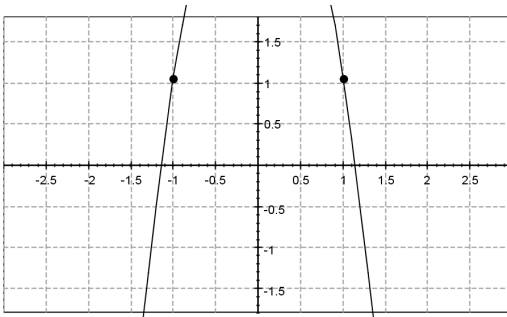
18.  $A = 10t + 66$   
 $A(t) = 10t + 66$

19.  $(3, 7)$

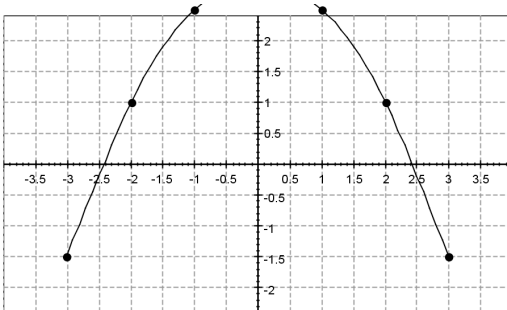
20.



21.



22.



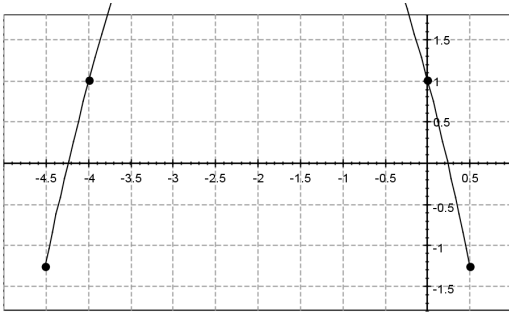
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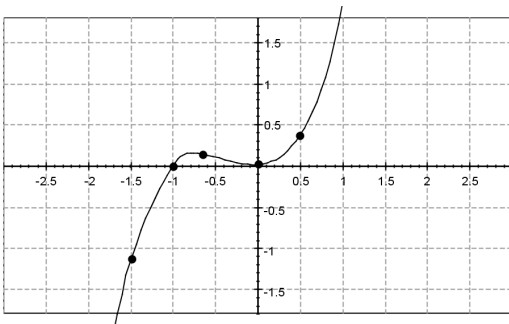
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23.

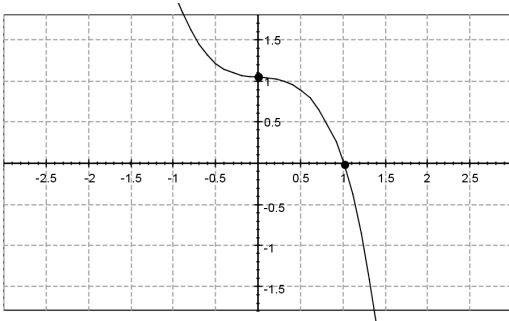


- 24. (0,4)
- 25. (-1,0)
- 26. (9,0)
- 27. (6,4)
- 28. (-1.5,5)
- 29. 1369
- 30. 25
- 31. 17,17
- 32. 4,8
- 33. 8,4
- 34. 150
- 35. 90
- 36. \$90
- 37. 7

38.



39.

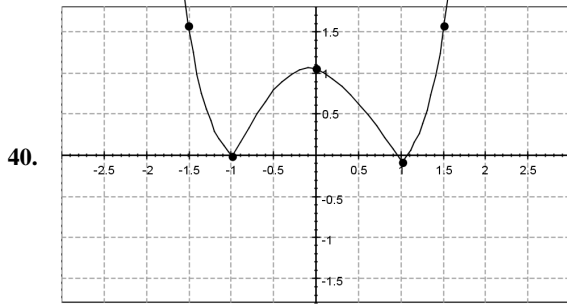


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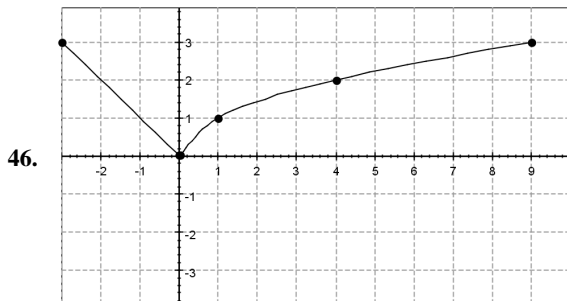
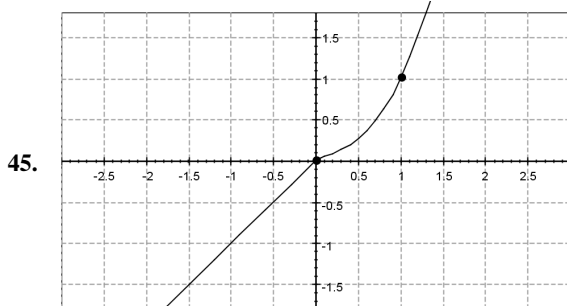
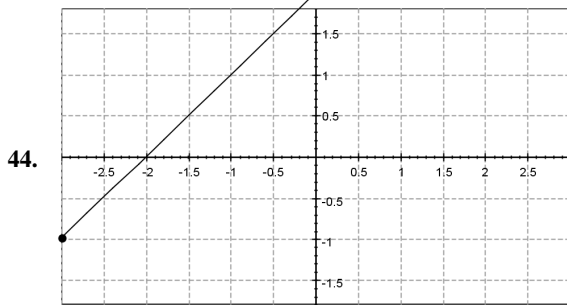
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- 41.  $(0, \infty)$
- 42.  $(0, \infty)$
- 43.  $(-\infty, 0)$

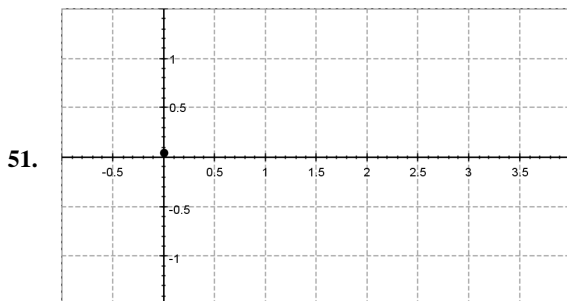
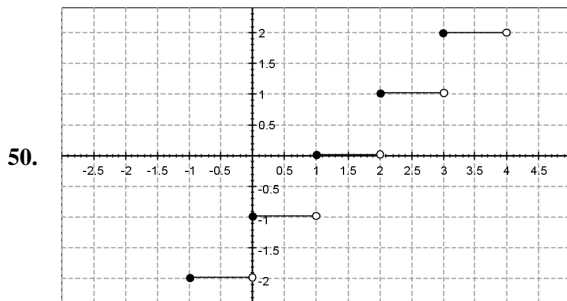
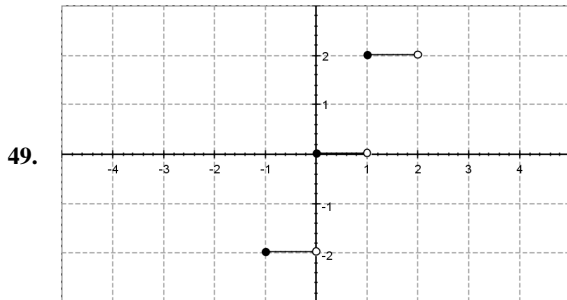
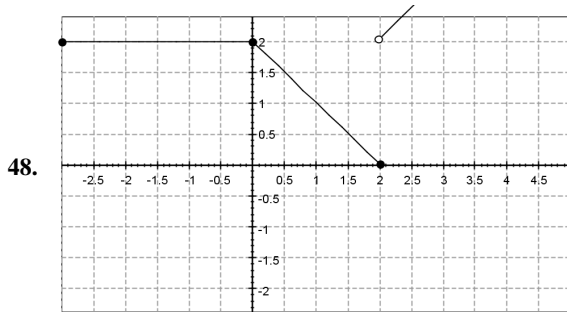
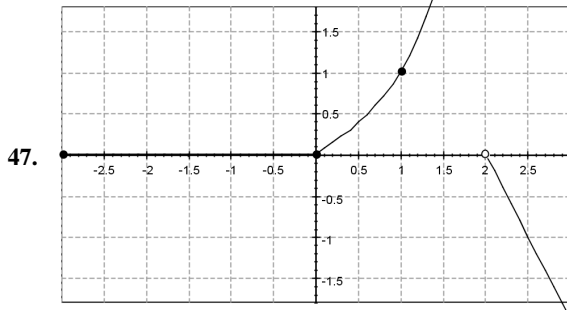


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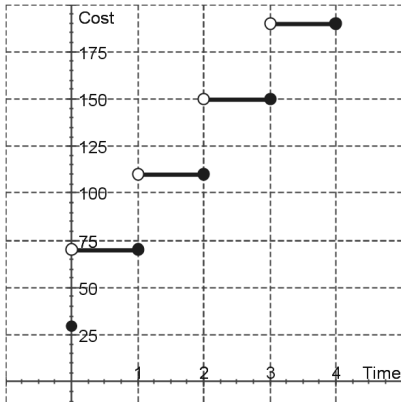
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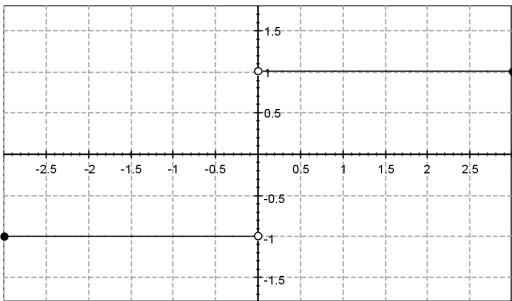
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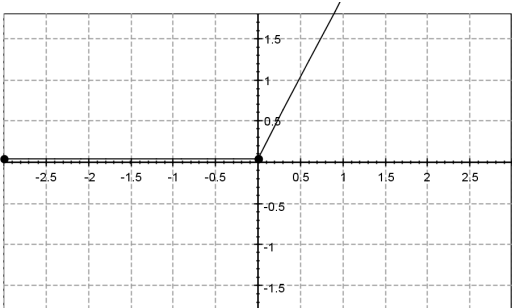
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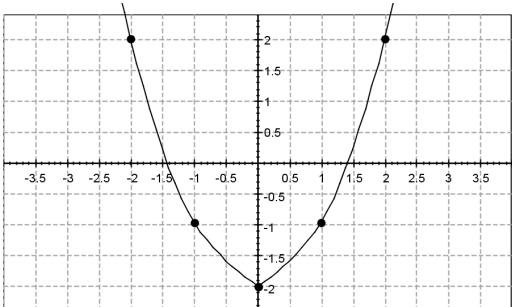
53.



54.



55.



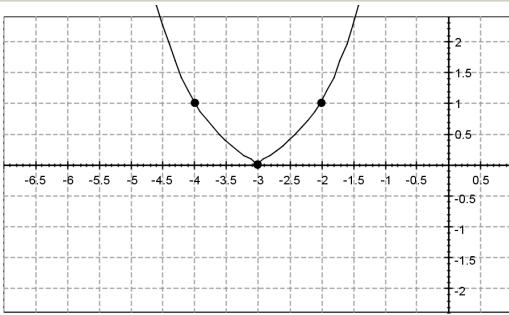
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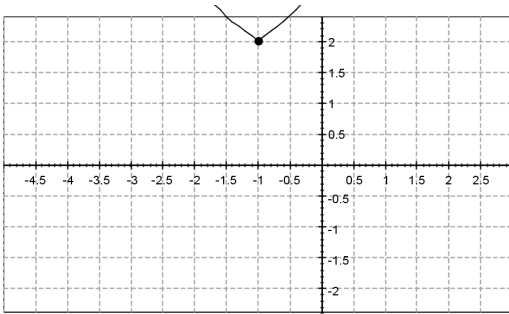
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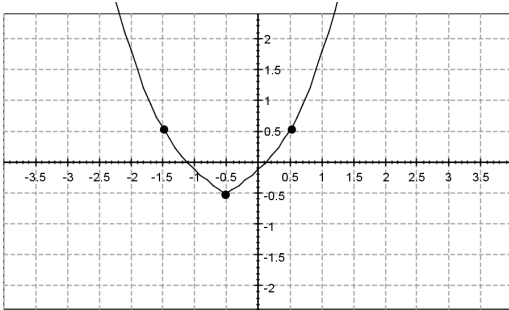
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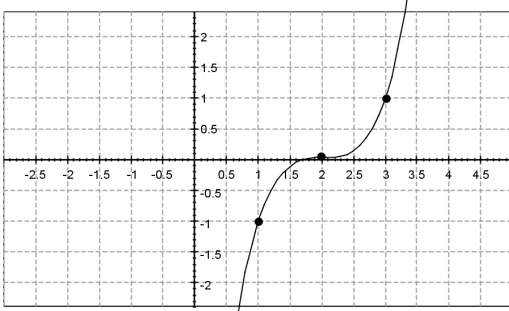
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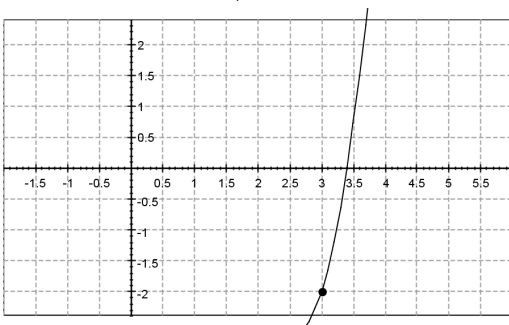
58.



59.



60.





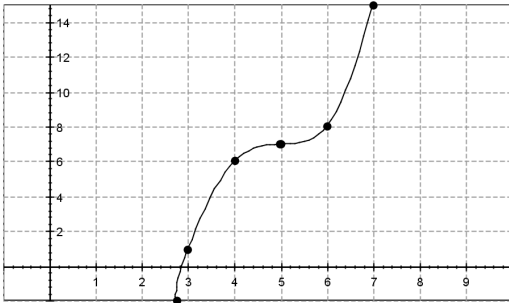
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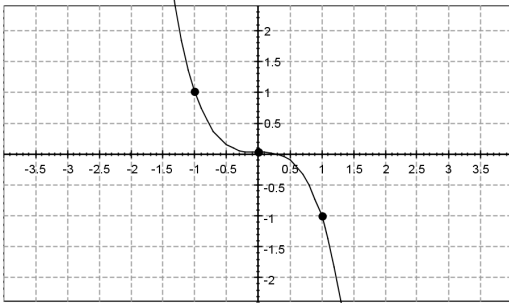
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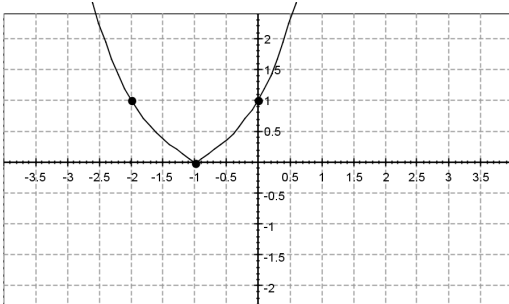
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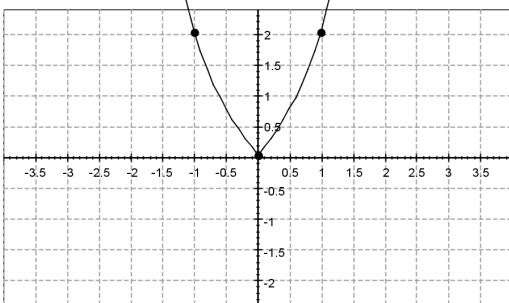
62.



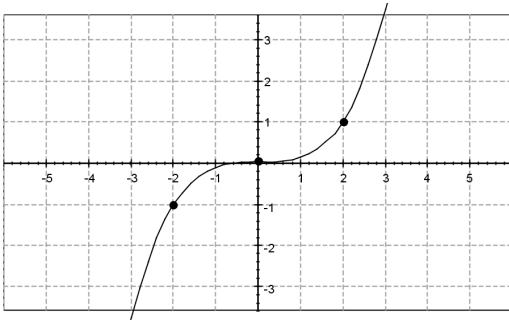
63.



64.



65.



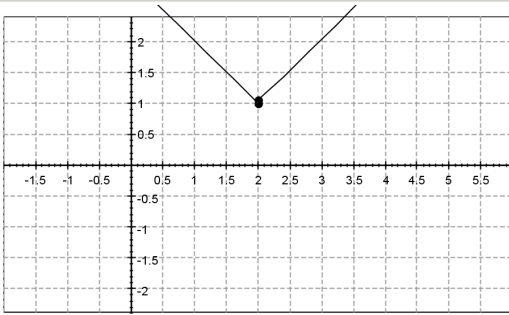
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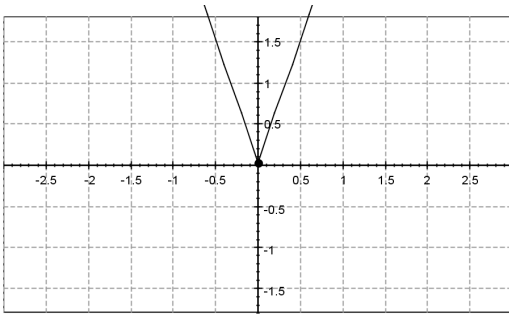
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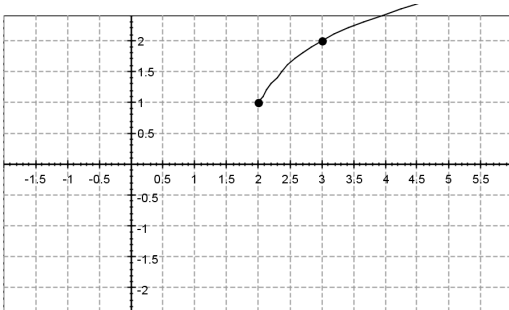
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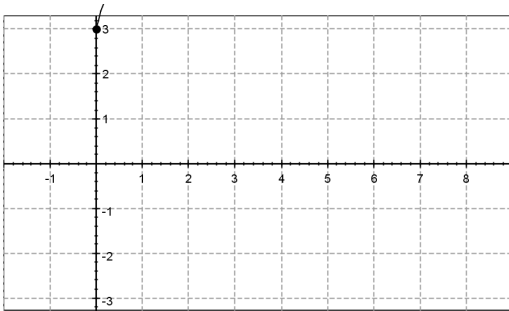
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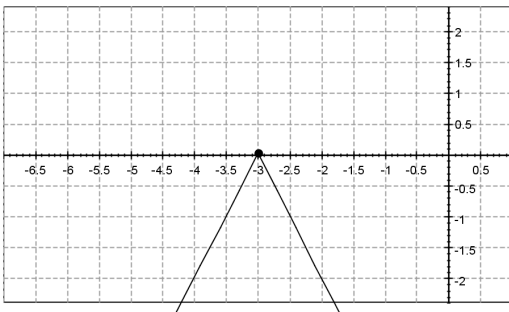
68.



69.



70.



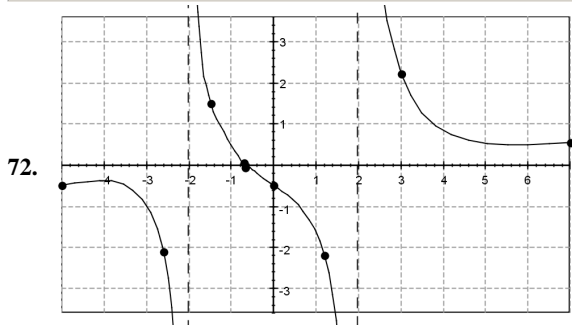
71. (0,5)

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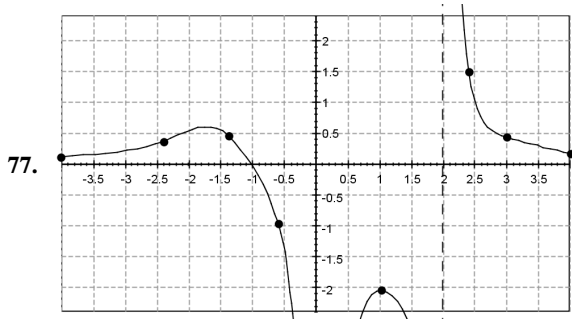
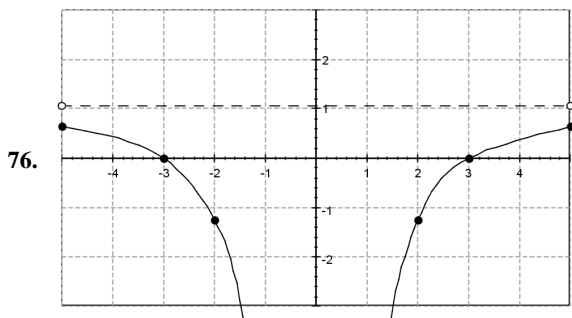
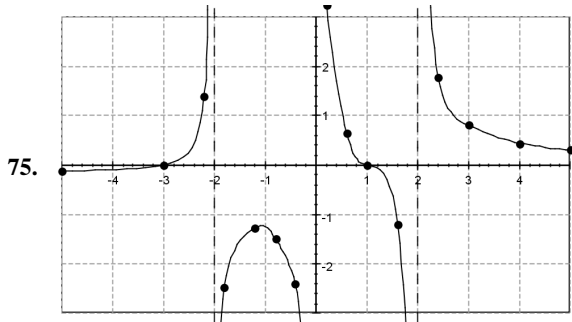
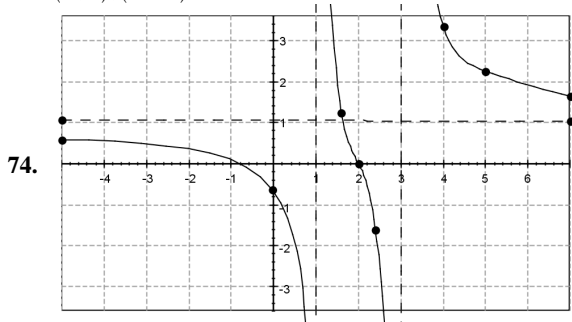
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73.  $(3,0), (-3,0)$

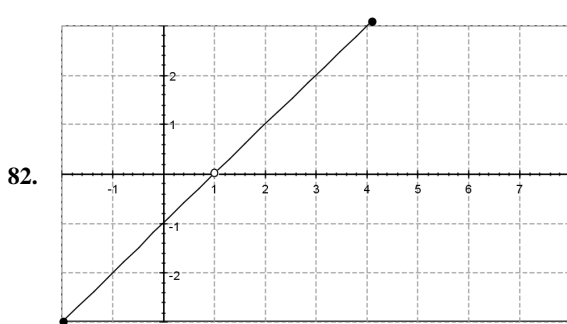
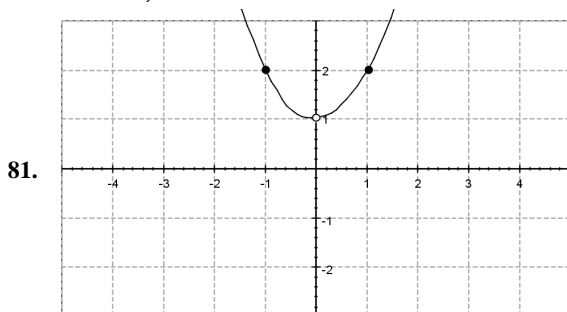
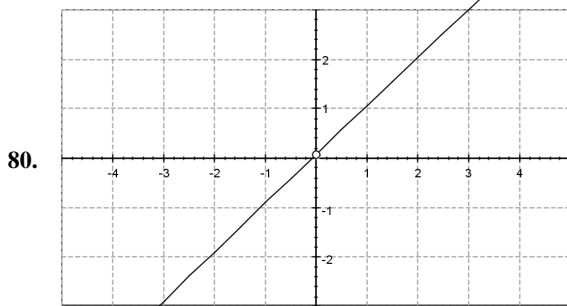
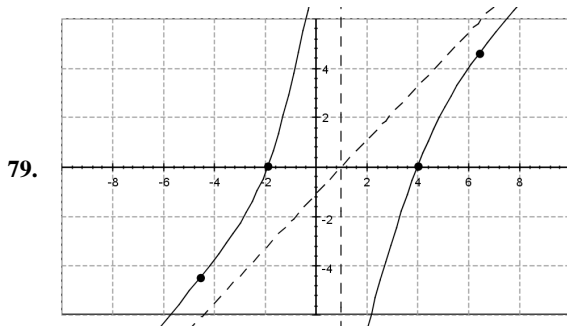
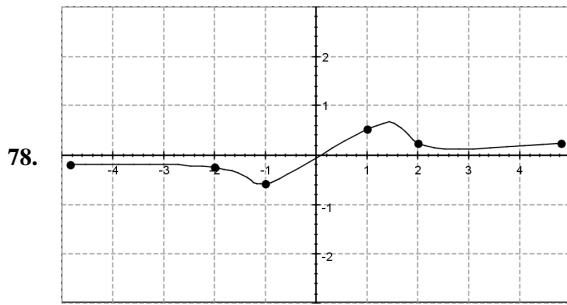


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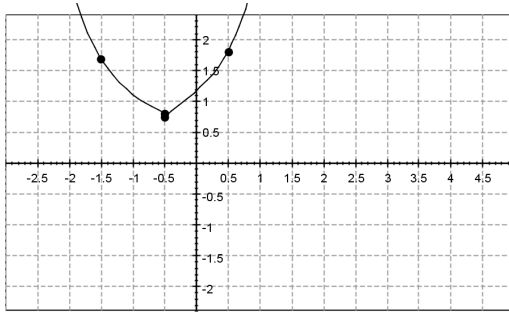
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83.



84. 3.00

85.  $f(n)=0.07n+7.50$

$0.07n+7.50$

$f(n)=\frac{0.105n+6.500}{n}$

86.  $\frac{0.105n+6.500}{n}$

87.  $(-\infty, \infty)$

88.  $-x+3$

89. 37

90. -112

91. 1726

92.  $3x+3$

93.  $4x$

94.  $\sqrt{x+1}$

95.  $[0, \infty)$

96.  $(-\infty, \infty)$

97.  $x$

98.  $(-\infty, 2) \cup (2, 2.5) \cup (2.5, \infty)$

99.  $T=875-55t$

100.  $\frac{16x}{(9x+1)}$

101. 0

102.  $\frac{x}{5}$

$y=\frac{x}{5}$

103.  $\frac{9}{(x-2)}$

$y=\frac{9}{(x-2)}$

104.  $\frac{1}{(7x)}$

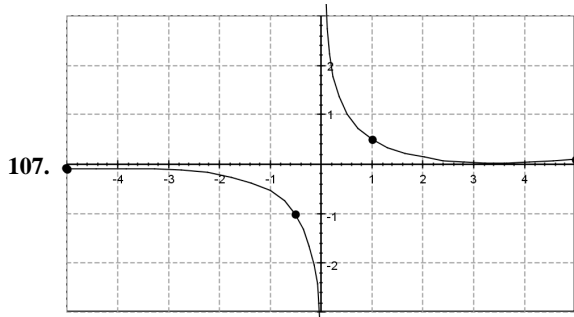
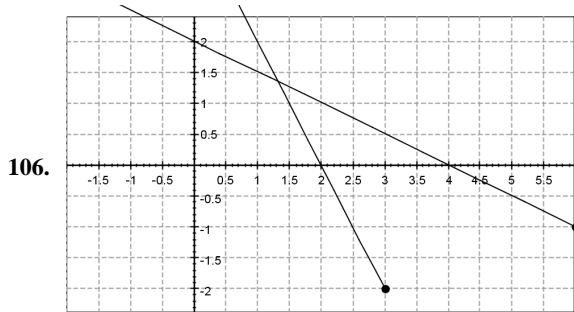
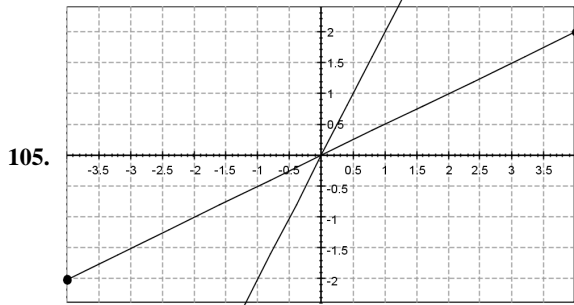
$\frac{1}{7x}$

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108.  $-\sqrt{x+8}$   
 $-\sqrt{8+x}$

109.  $\sqrt{\frac{10}{x}}$   
 $\frac{\sqrt{10}}{\sqrt{x}}$

110.  $-\sqrt{x^2+6}$   
 $-\sqrt{6+x^2}$

111.  $f(x) \neq 7$   
 $(-\infty, 7) \cup (7, \infty)$

112.  $f(x) \neq -3$

113.  $y = 0.6x + 11.0$

114. 9.8

115.  $y = 0.02 + \frac{10}{x}$

116. 119