Math 102
E3 Preparation Part 2 Sections 3.5 to 3.5 v02
NO BOOK/ NO NOTES/YES CALCUATOR
Dressler Fall 2016

Name_____

Solve the problem. (Section 3.2 from textbook .)

1) You have 304 feet of fencing to enclose a rectangular region. Find the dimensions of the rectangle that maximize the enclosed area. 1) _____

2) You have 232 feet of fencing to enclose a rectangular region. Find the dimensions of the rectangle that maximize the enclosed area. 2) _____

3) A developer wants to enclose a rectangular grassy lot that borders a city street for parking. If the developer has 344 feet of fencing and does not fence the side along the street, what is the largest area that can be enclosed? 3) _____

4) A developer wants to enclose a rectangular grassy lot that borders a city street for parking. If the developer has 336 feet of fencing and does not fence the side along the street, what is the largest area that can be enclosed? 4) _____

5) You have 92 feet of fencing to enclose a rectangular region. What is the maximum area? 5) _____

6) You have 200 feet of fencing to enclose a rectangular region. What is the maximum area? 6) _____

7) You have 60 feet of fencing to enclose a rectangular plot that borders on a river. If you do not fence the side along the river, find the length and width of the plot that will maximize the area. 7) _____

8) You have 96 feet of fencing to enclose a rectangular plot that borders on a river. If you do not fence the side along the river, find the length and width of the plot that will maximize the area. 8) _____

9) You have 80 feet of fencing to enclose a rectangular plot that borders on a river. If you do not fence the side along the river, find the length and width of the plot that will maximize the area. 9) _____

10) A rain gutter is made from sheets of aluminum that are 18 inches wide by turning up the edges to form right angles. Determine the depth of the gutter that will maximize its cross–sectional area and allow the greatest amount of water to flow. 10) _____

11) A rectangular playground is to be fenced off and divided in two by another fence parallel to one side of the playground. 216 feet of fencing is used. Find the dimensions of the playground that maximize the total enclosed area. 11) _____

12) A rectangular playground is to be fenced off and divided in two by another fence parallel to one side of the playground. 240 feet of fencing is used. Find the dimensions of the playground that maximize the total enclosed area. 12) _____

13) A rectangular playground is to be fenced off and divided in two by another fence parallel to one side of the playground. 528 feet of fencing is used. Find the maximum area of the playground. 13) _____

14) A rectangular playground is to be fenced off and divided in two by another fence parallel to one side of the playground. 576 feet of fencing is used. Find the maximum area of the playground. 14) _____

Find the domain of the rational function.

15) $h(x) = \frac{7x}{x + 4}$ 15) _____

16) $g(x) = \frac{8x}{x - 9}$ 16) _____

17) $h(x) = \frac{4x}{(x + 3)(x - 3)}$ 17) _____

18) $g(x) = \frac{8x^2}{(x - 6)(x + 1)}$ 18) _____

19) $g(x) = \frac{x + 8}{x^2 - 16}$ 19) _____

20) $g(x) = \frac{x + 9}{x^2 - 49}$ 20) _____

21) $f(x) = \frac{x + 5}{x^2 + 4}$ 21) _____

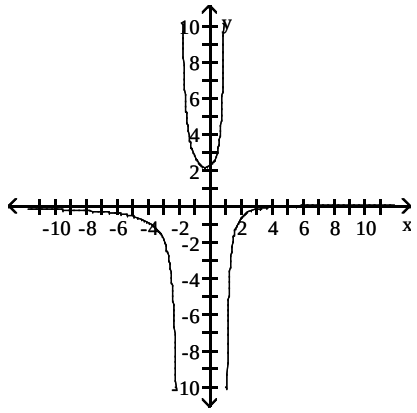
22) $h(x) = \frac{x + 7}{x^2 + 1}$ 22) _____

23) $h(x) = \dfrac{x + 9}{x^2 + 4x}$ 23) _____

24) $f(x) = \dfrac{x + 5}{x^2 + 4x}$ 24) _____

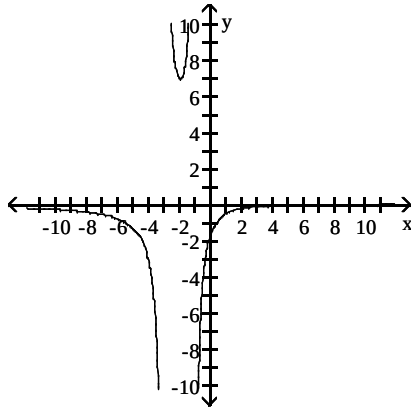
Use the graph of the rational function shown to complete the statement.

25) 25) _____



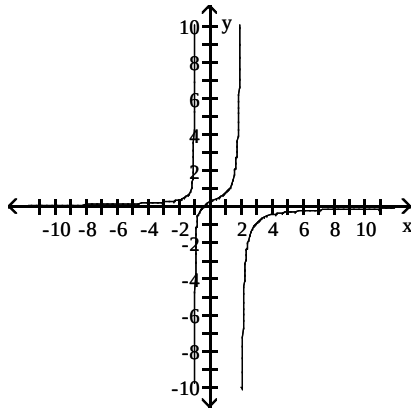
As $x \to -2^+$, $f(x) \to$?

26) 26) _____



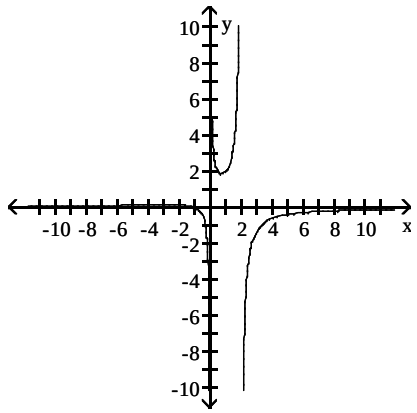
As $x \to -3^+$, $f(x) \to$?

27) 27) _____



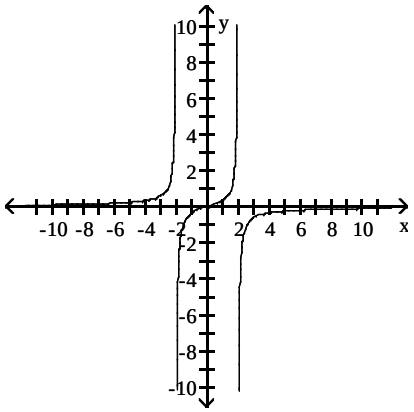
As $x \to 2^-$, $f(x) \to$?

28) 28) _____



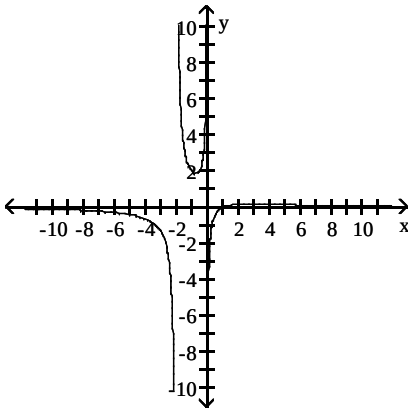
As $x \to 2^+$, $f(x) \to$?

29) 29) _____



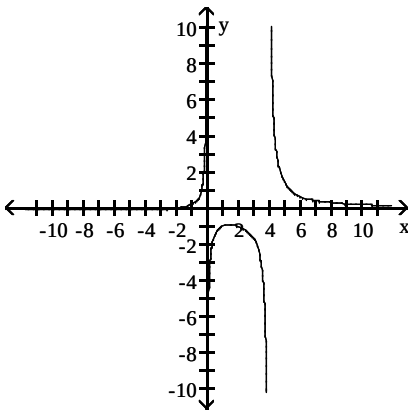
As $x \to -\infty$, $f(x) \to$?

30) 30) _____



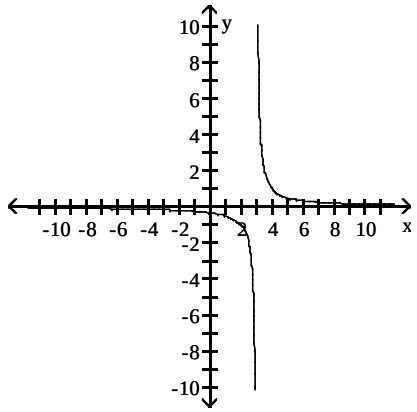
As $x \to +\infty$, $f(x) \to$?

31) 31) _____



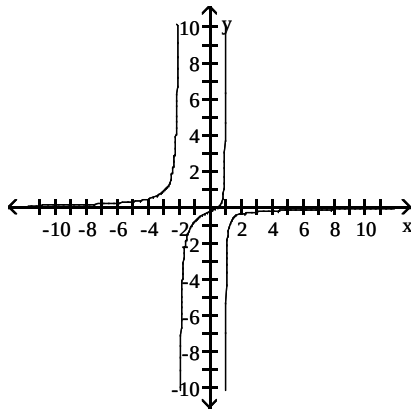
As $x \to 4^+$, $f(x) \to$?

32) 32) _____



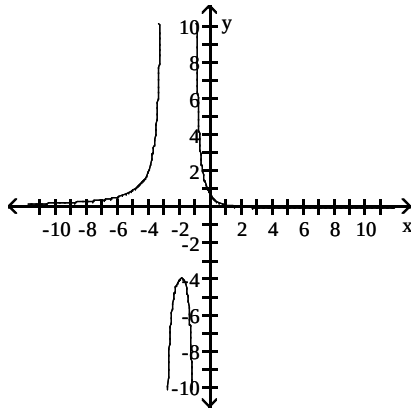
As $x \to 3^-$, $f(x) \to$?

33) 33) _____



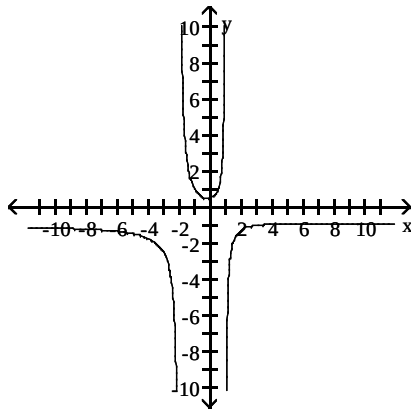
As $x \to -2^-$, $f(x) \to$?

34) 34) _____



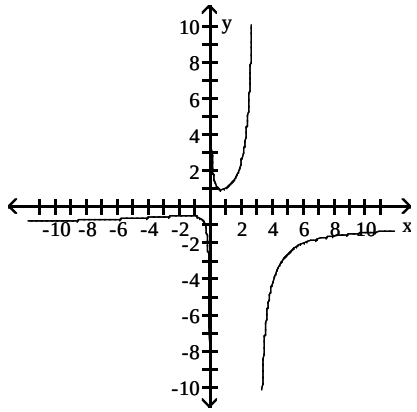
As $x \to -3^+$, $f(x) \to$?

35) 35) _____



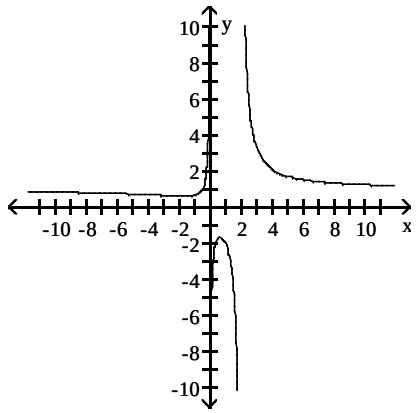
As $x \to -2^+$, $f(x) \to$?

36) 36) _____

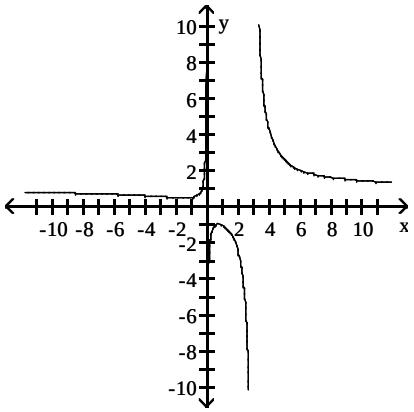


As $x \to 0^-$, $f(x) \to$?

37) 37) _____

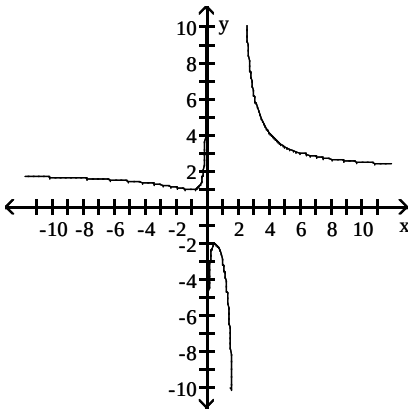


As $x \to 2^-$, $f(x) \to$?

38) 

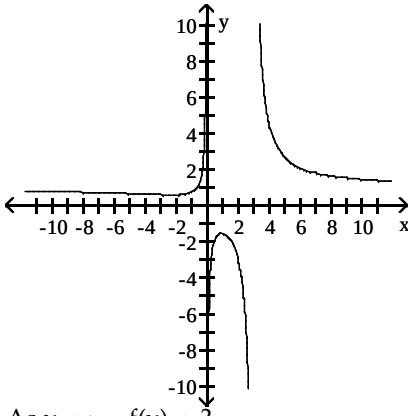
As $x \to 3^-$, $f(x) \to$?

38) _____

39) 

As $x \to +\infty$, $f(x) \to$?

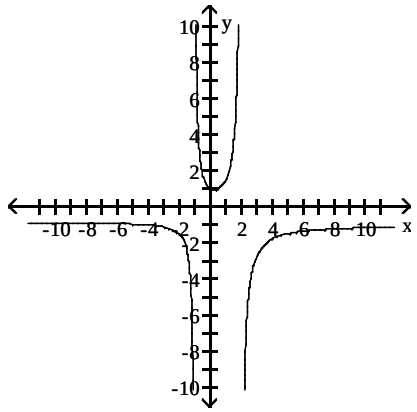
39) _____

40) 

As $x \to +\infty$, $f(x) \to$?

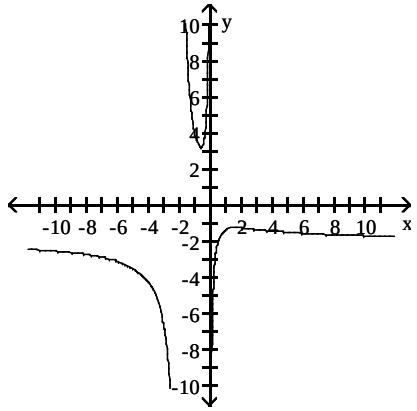
40) _____

41) 41) _____



As $x \to -1^-$, $f(x) \to$?

42) 42) _____



As $x \to -2^+$, $f(x) \to$?

Find the vertical asymptotes, if any, of the graph of the rational function.

43) $g(x) = \dfrac{x}{x - 4}$ 43) _____

44) $g(x) = \dfrac{x}{x + 1}$ 44) _____

45) $f(x) = \frac{x - 4}{x(x + 3)}$ 45) _____

46) $h(x) = \frac{x + 5}{x(x - 5)}$ 46) _____

47) $g(x) = \frac{x}{x(x + 5)}$ 47) _____

48) $g(x) = \frac{x}{x(x + 3)}$ 48) _____

49) $f(x) = \frac{x}{x^2 + 9}$ 49) _____

50) $f(x) = \frac{x}{x^2 + 9}$ 50) _____

51) $g(x) = \frac{x}{x^2 - 1}$ 51) _____

52) $g(x) = \frac{x}{x^2 - 1}$ 52) _____

53) $h(x) = \frac{x + 2}{x^2 - 4}$ 53) _____

54) $h(x) = \frac{x + 5}{x^2 - 25}$ 54) _____

55) $\frac{x - 36}{x^2 - 7x + 12}$ 55) _____

56) $\frac{x - 64}{x^2 - 10x + 16}$ 56) _____

Find the horizontal asymptote, if any, of the graph of the rational function.

57) $f(x) = \frac{15x}{3x^2 + 1}$ 57) _____

58) $f(x) = \frac{10x}{2x^2 + 1}$ 58) _____

59) $g(x) = \frac{4x^2}{2x^2 + 1}$ 59) _____

60) $g(x) = \frac{15x^2}{5x^2 + 1}$ 60) _____

61) $h(x) = \frac{6x^3}{3x^2 + 1}$ 61) _____

62) $h(x) = \frac{4x^3}{2x^2 + 1}$ 62) _____

63) $f(x) = \frac{5x}{5x + 8}$ 63) _____

64) $f(x) = \frac{2x}{2x + 3}$ 64) _____

65) $h(x) = \frac{-4x - 1}{5x + 6}$ 65) _____

66) $g(x) = \frac{-5x + 7}{3x - 7}$ 66) _____

67) $g(x) = \frac{8x^2 - 5x - 3}{3x^2 - 6x + 3}$ 67) _____

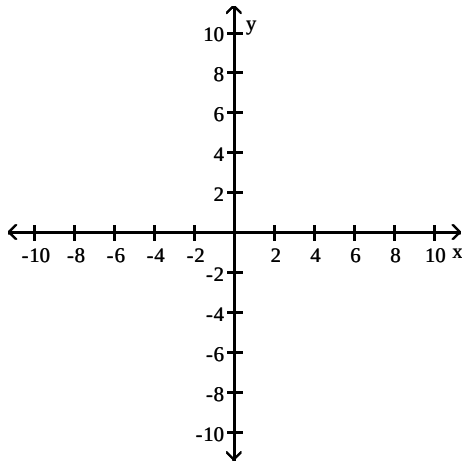
68) $g(x) = \frac{3x^2 - 5x - 3}{9x^2 - 3x + 4}$ 68) _____

69) $f(x) = \dfrac{-8x}{2x^3 + x^2 + 1}$ 69) _____

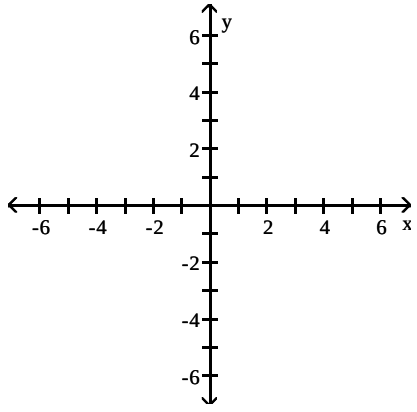
70) $f(x) = \dfrac{-25x}{5x^3 + x^2 + 1}$ 70) _____

Use transformations of $f(x) = \dfrac{1}{x}$ or $f(x) = \dfrac{1}{x^2}$ to graph the rational function.

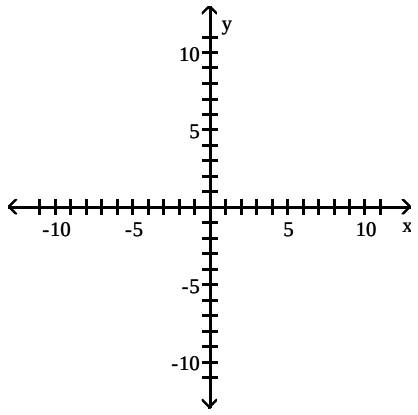
71) $f(x) = \dfrac{1}{x + 5}$ 71) _____



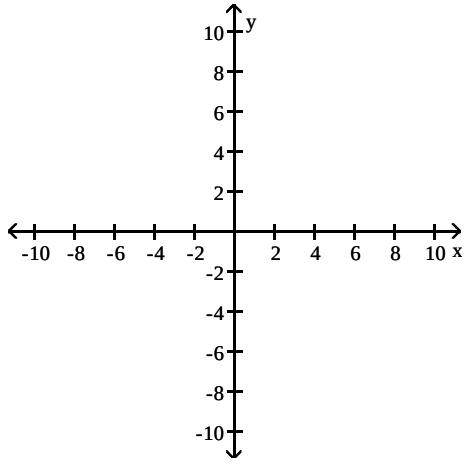
72) $f(x) = \dfrac{1}{x} + 3$ 72) _____



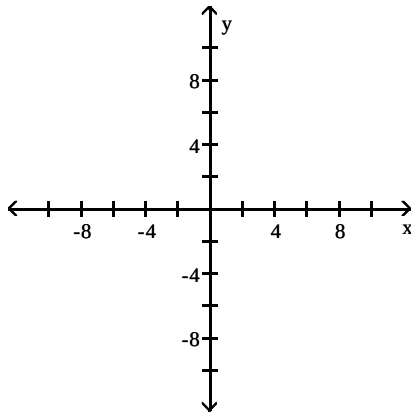
73) $f(x) = \dfrac{1}{x - 3} + 3$ 73) _____



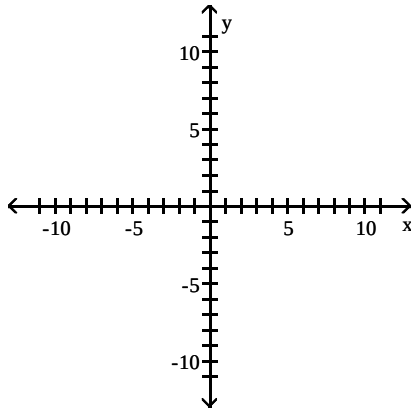
74) $g(x) = \dfrac{1}{(x - 4)^2}$ 74) _____



75) $f(x) = \frac{1}{x^2} + 4$ 75) _____



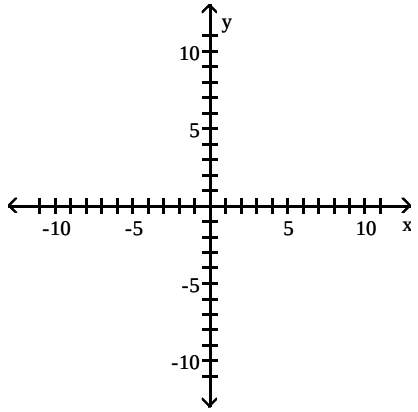
76) $f(x) = \frac{1}{(x-3)^2} + 3$ 76) _____



Graph the rational function.

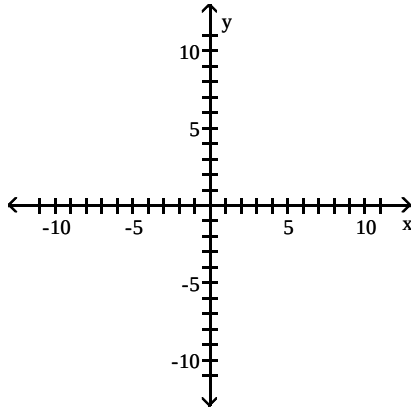
77) $f(x) = \frac{2x}{x - 4}$

77) _____



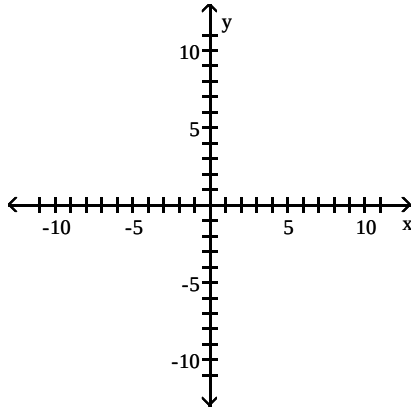
78) $f(x) = \frac{4x}{x^2 - 16}$

78) _____



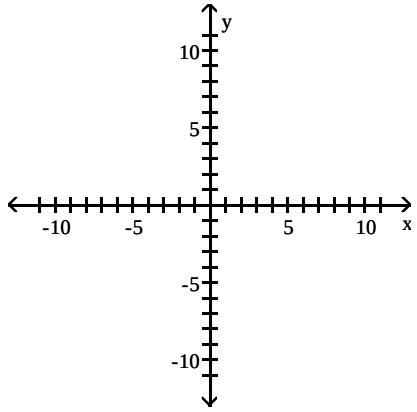
79) $f(x) = \frac{2x^2}{x^2 - 1}$

79) _____

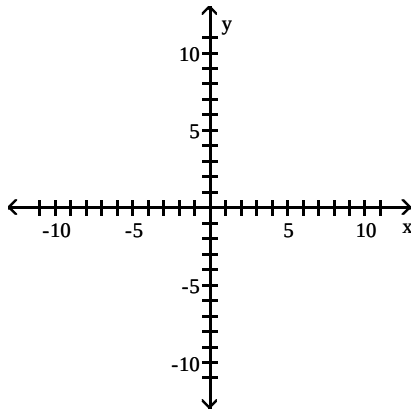


80) $f(x) = \frac{-4x}{x + 1}$

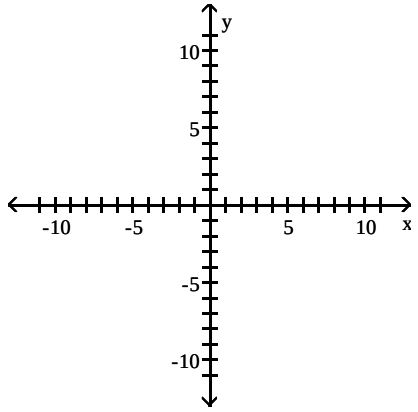
80) _____



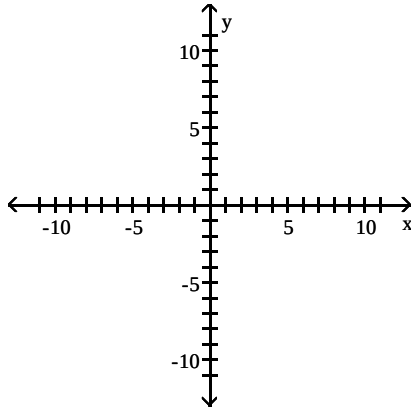
81) $f(x) = -\dfrac{2}{x^2 - 9}$ 81) _____



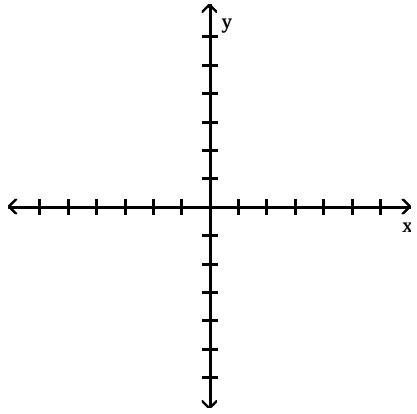
82) $f(x) = \dfrac{6}{x^2 + 10x + 25}$ 82) _____



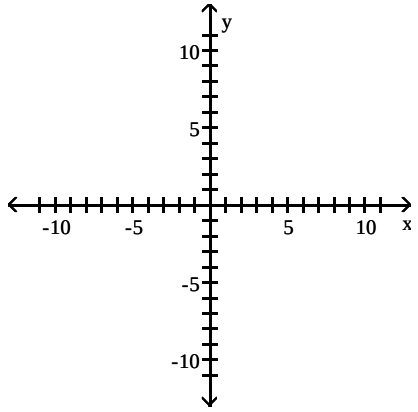
83) $f(x) = \dfrac{3x^2}{x^2 + 9}$ 83) _____



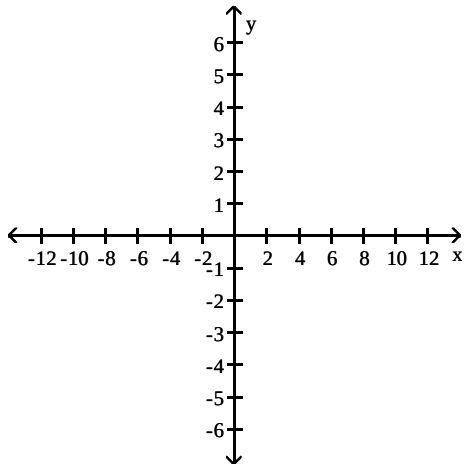
84) $f(x) = \dfrac{x^2 + 8x + 15}{x^2 - 4}$ 84) _____



85) $f(x) = \dfrac{x^4}{x^2 + 1}$ 85) _____

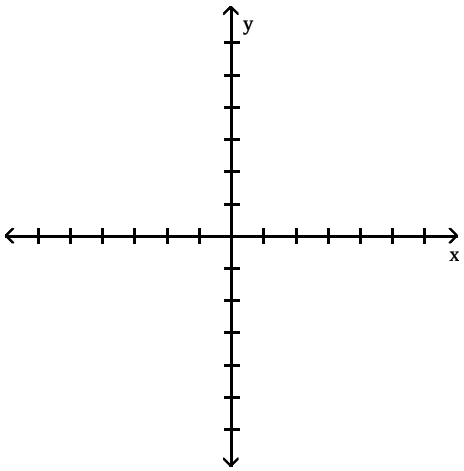


86) $f(x) = \dfrac{x - 2}{x^2 - x - 20}$ 86) _____



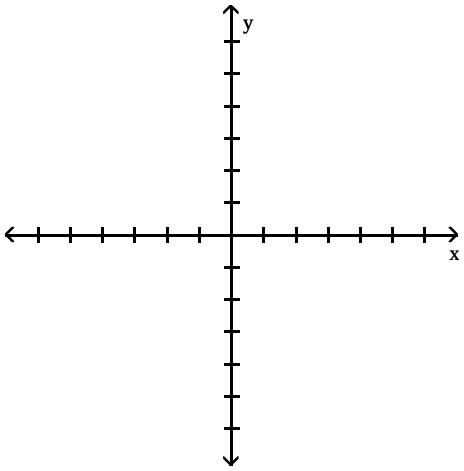
87) $f(x) = \dfrac{x^2}{x^2 - x - 56}$

87) _____

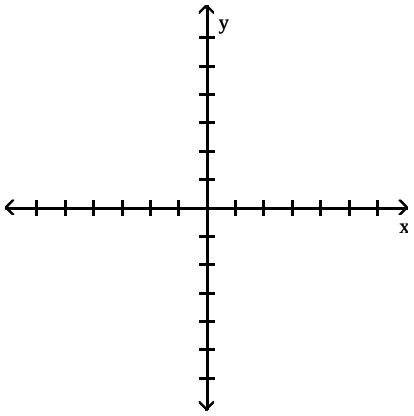


88) $f(x) = \dfrac{x^2 - x - 6}{x^2 - 1}$

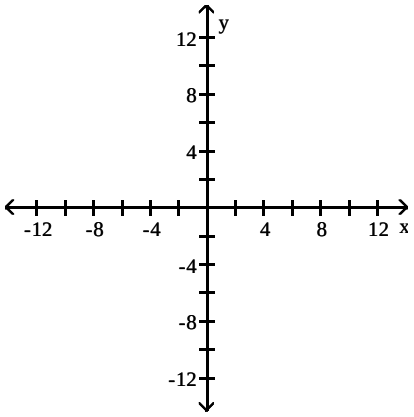
88) _____



89) $f(x) = \dfrac{x^2 + 2x}{(x - 1)^2}$ 89) _____



90) $f(x) = \dfrac{x^2 - 9x + 20}{(x - 3)^2}$ 90) _____



Solve the problem.

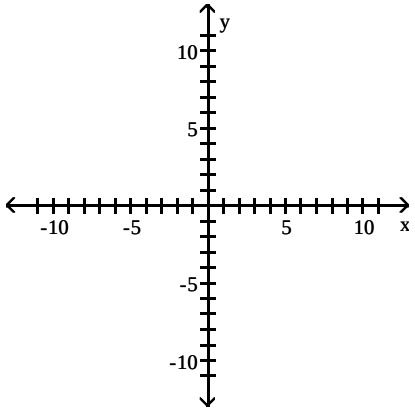
91) Is there y–axis symmetry for the rational function $f(x) = \dfrac{6x^2}{-8x^4 - 2}$? 91) _____

Find the slant asymptote, if any, of the graph of the rational function.

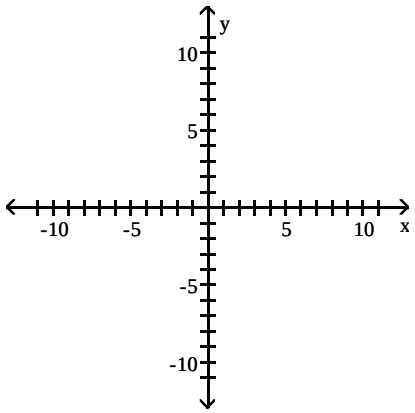
92) $f(x) = \dfrac{x^2 + 16}{x}$ 92) _____

Graph the function.

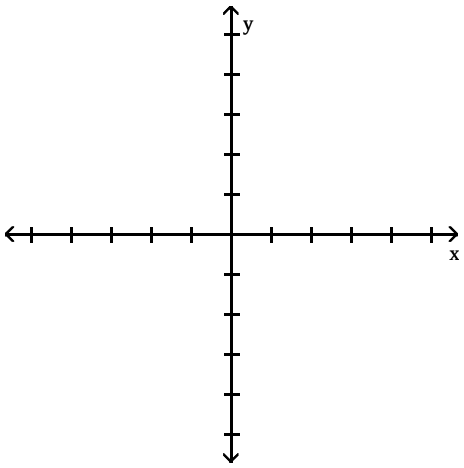
93) $f(x) = \dfrac{x^2 + 4}{x}$ 93) _____



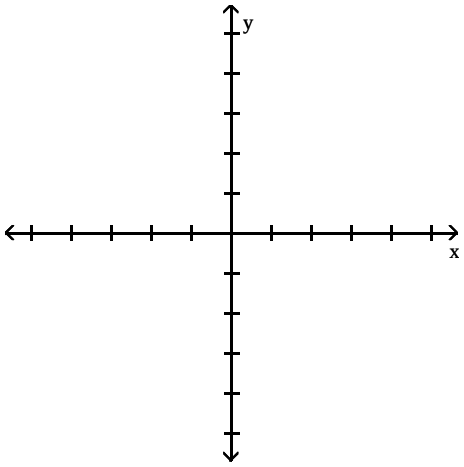
94) $f(x) = \dfrac{x^2 - 1}{x}$ 94) _____



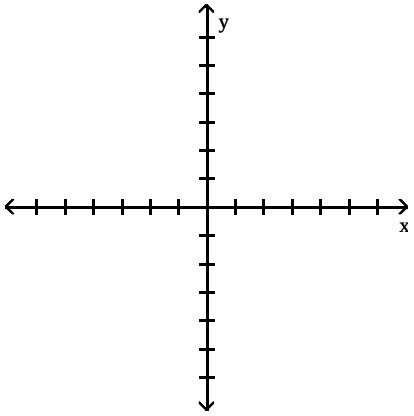
95) $f(x) = \frac{x^2 + 6x - 3}{x - 6}$ 95) _____



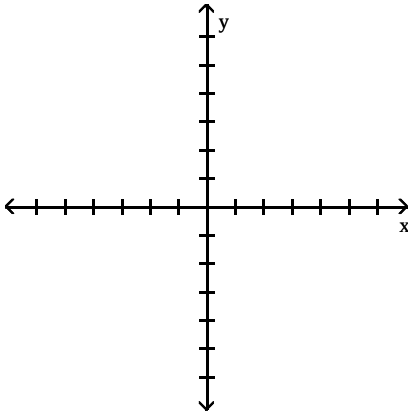
96) $f(x) = \frac{x^2 + 9x - 2}{x - 2}$ 96) _____



97) $f(x) = \dfrac{x^3 + 4}{x^2 + 3x}$ 97) _____



98) $f(x) = \dfrac{x^3 + 3}{x^2 - 3x}$ 98) _____



Find the slant asymptote, if any, of the graph of the rational function.

99) $f(x) = \dfrac{x^2 - 9}{x}$ 99) _____

100) $f(x) = \dfrac{x^2 + 5x - 2}{x - 6}$ 100) _____

101) $f(x) = \frac{x^2 + 6x - 5}{x - 7}$ 101) _____

102) $f(x) = \frac{2x^2}{5x^2 + 8}$ 102) _____

103) $f(x) = \frac{3x^2}{2x^2 + 3}$ 103) _____

104) $f(x) = \frac{x^2 - 9x + 3}{x + 7}$ 104) _____

105) $f(x) = \frac{x^2 - 4x + 5}{x + 8}$ 105) _____

106) $f(x) = \frac{x^3 + 4}{x^2 - 49}$ 106) _____

107) $f(x) = \frac{x^3 + 7}{x^2 - 16}$ 107) _____

108) $g(x) = \frac{x^3 + 9}{x^2 + 4x}$ 108) _____

109) $f(x) = \dfrac{x^3 + 4}{x^2 + 2x}$ 109) _____

Solve the problem.

110) Is there y–axis symmetry for the rational function $f(x) = \dfrac{8x^2}{-7x^4 - 1}$? 110) _____

111) Is there y–axis symmetry for the rational function $f(x) = \dfrac{2x^2}{-2x^3 - 2}$? 111) _____

112) Is there y–axis symmetry for the rational function $f(x) = \dfrac{-4x^2}{-7x^3 - 4}$? 112) _____

113) Is there y–axis symmetry for the rational function $f(x) = \dfrac{8x^2 + 8x - 19}{-6x + 2}$? 113) _____

114) Is there y–axis symmetry for the rational function $f(x) = \dfrac{-2x^2 - 2x - 5}{6x + 20}$? 114) _____

115) Is there origin symmetry for the rational function $f(x) = \dfrac{7x}{2x^2 + 18}$? 115) _____

116) Is there origin symmetry for the rational function $f(x) = \dfrac{-9x}{-6x^2 + 20}$? 116) _____

117) Is there origin symmetry for the rational function $f(x) = \frac{9x^2 + 4}{-2x}$? 117) _____

118) Is there origin symmetry for the rational function $f(x) = \frac{9x^2 + 13}{6x}$? 118) _____

119) Is there origin symmetry for the rational function $f(x) = \frac{-5x^2 - 13}{-9x^2 + 14}$? 119) _____

120) Is there origin symmetry for the rational function $f(x) = \frac{-3x^2 - 18}{-6x^2 + 5}$? 120) _____

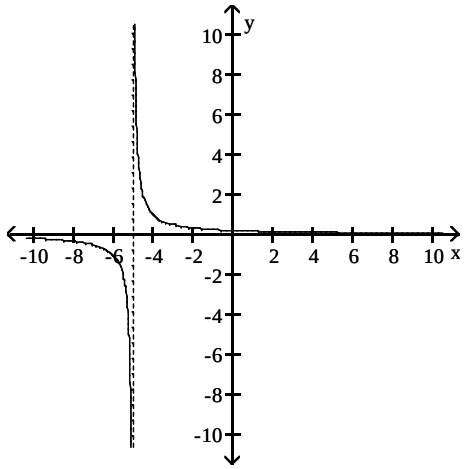
121) Is there y–axis symmetry for the rational function $f(x) = \frac{5x^2 + 5x - 17}{-2x + 4}$? 121) _____

122) Is there y–axis symmetry for the rational function $f(x) = \frac{8x^2 + 8x - 7}{7x + 7}$? 122) _____

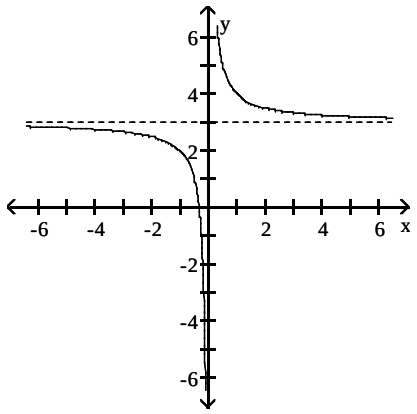
123) Is there origin symmetry for the rational function $f(x) = \frac{2x^2 - 13}{2x^2 + 4}$? 123) _____

1) 76 ft by 76 ft
2) 58 ft by 58 ft
3) 14,792 ft^2
4) 14,112 ft^2
5) 529 square feet
6) 2500 square feet
7) length: 30 feet, width: 15 feet
8) length: 48 feet, width: 24 feet
9) length: 40 feet, width: 20 feet
10) 4.5 inches
11) 36 ft by 54 ft
12) 40 ft by 60 ft
13) 11,616 ft^2
14) 13,824 ft^2
15) $\{x|x \neq -4\}$
16) $\{x|x \neq 9\}$
17) $\{x|x \neq -3, x \neq 3\}$
18) $\{x|x \neq 6, x \neq -1\}$
19) $\{x|x \neq -4, x \neq 4\}$
20) $\{x|x \neq -7, x \neq 7\}$
21) all real numbers
22) all real numbers
23) $\{x|x \neq 0, x \neq -4\}$
24) $\{x|x \neq 0, x \neq -4\}$
25) $+\infty$
26) $+\infty$
27) $+\infty$
28) $-\infty$
29) 0
30) 0
31) $+\infty$
32) $-\infty$
33) $+\infty$
34) $-\infty$
35) $+\infty$
36) $-\infty$
37) $-\infty$
38) $-\infty$
39) 2
40) 1
41) $-\infty$
42) $+\infty$
43) $x = 4$
44) $x = -1$
45) $x = 0$ and $x = -3$
46) $x = 0$ and $x = 5$
47) $x = 0$ and $x = -5$
48) $x = 0$ and $x = -3$
49) no vertical asymptote
50) no vertical asymptote

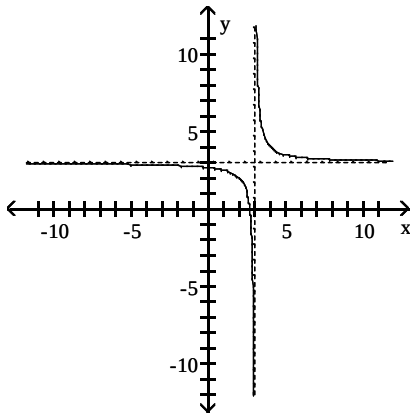
51) $x = 1, x = -1$
52) $x = 1, x = -1$
53) $x = 2$
54) $x = 5$
55) $x = 3, x = 4$
56) $x = 8, x = 2$
57) $y = 0$
58) $y = 0$
59) $y = 2$
60) $y = 3$
61) no horizontal asymptote
62) no horizontal asymptote
63) $y = 1$
64) $y = 1$
65) $y = -\frac{4}{5}$
66) $y = -\frac{5}{3}$
67) $y = \frac{8}{3}$
68) $y = \frac{1}{3}$
69) $y = 0$
70) $y = 0$
71)



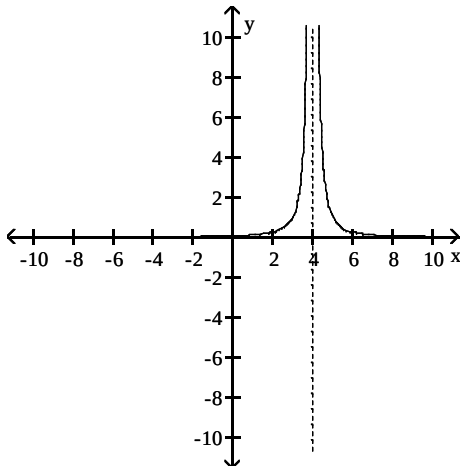
72)


y
x
6
4
2
-2
-4
-6
-6
-4
-2
2
4
6

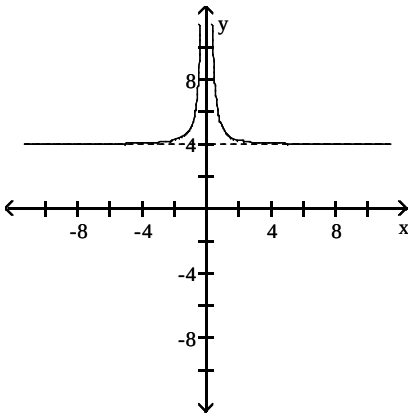
73)


y
x
10
5
-5
-10
-10
-5
5
10

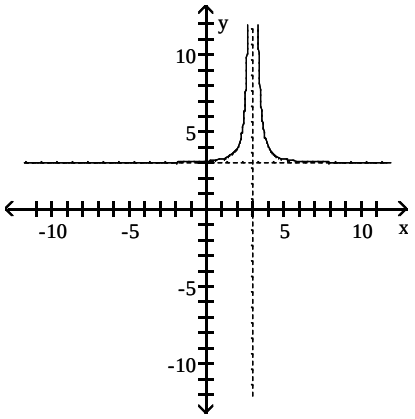
74)


y
x
10
8
6
4
2
-2
-4
-6
-8
-10
-10
-8
-6
-4
-2
2
4
6
8
10

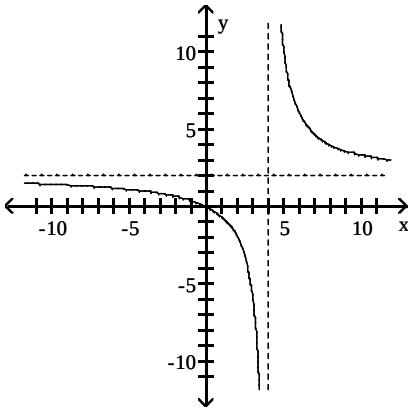
75)



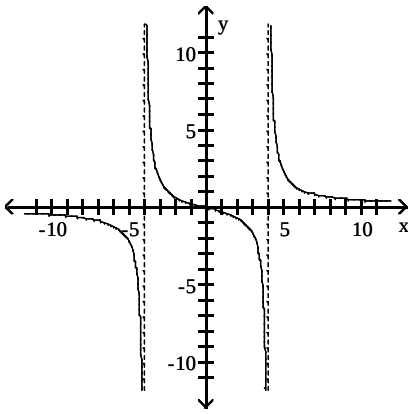
76)



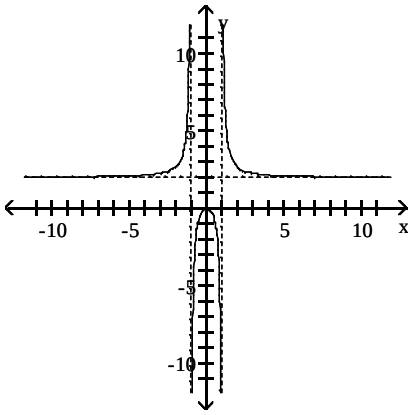
77)



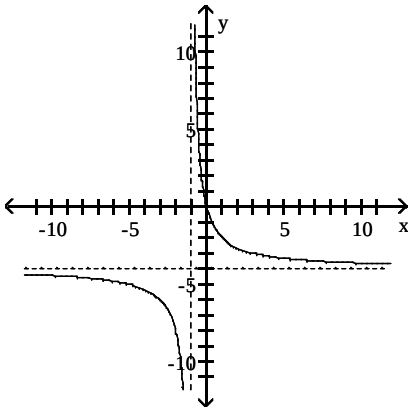
78)



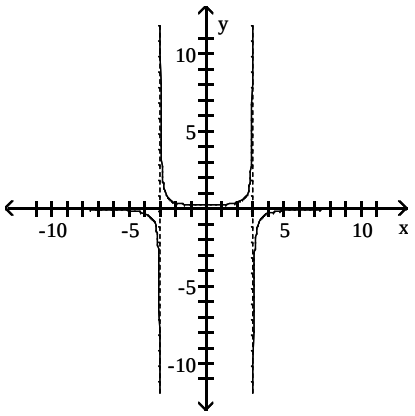
79)



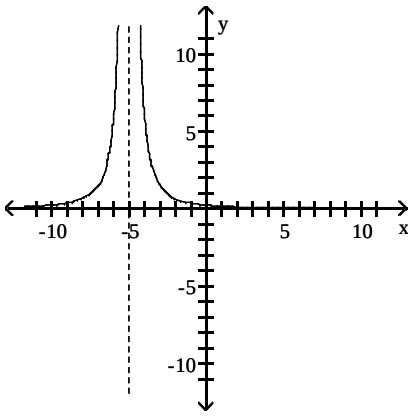
80)



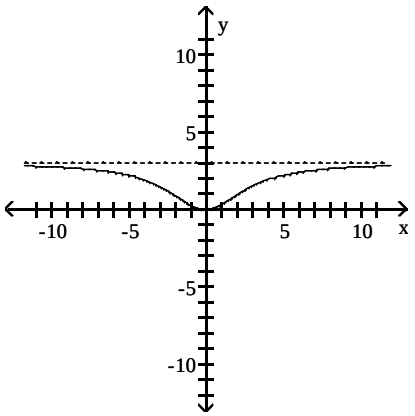
81)



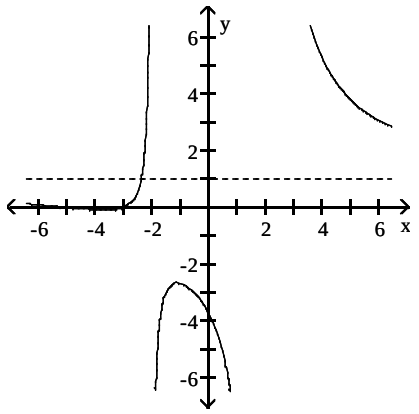
82)



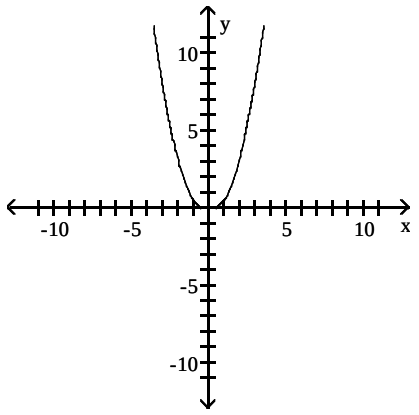
83)



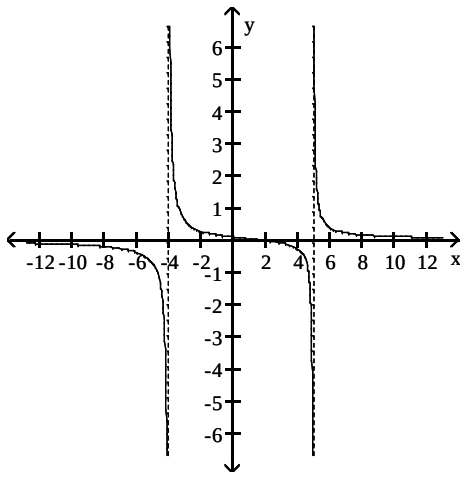
84)


y
x
6
4
2
-2
-4
-6
-6
-4
-2
2
4
6

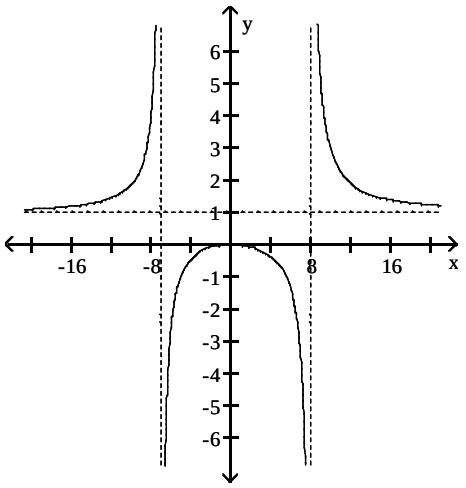
85)


y
x
10
5
-5
-10
-10
-5
5
10

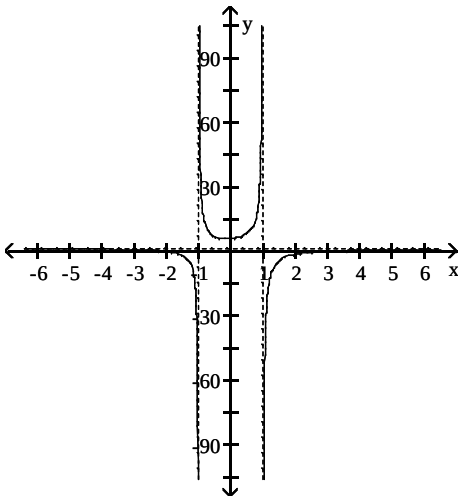
86)


y
x
6
5
4
3
2
1
-1
-2
-3
-4
-5
-6
-12
-10
-8
-6
-4
-2
2
4
6
8
10
12

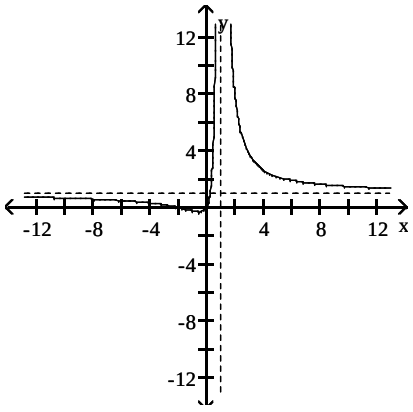
87)


y
6
5
4
3
2
1
-16
-8
8
16
x
-1
-2
-3
-4
-5
-6

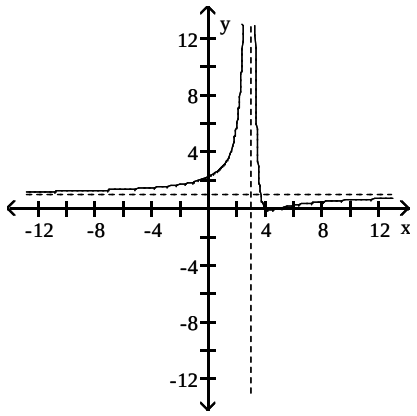
88)


y
90
60
30
-6 -5 -4 -3 -2 -1
1 2 3 4 5 6
x
-30
-60
-90

89)


y
12
8
4
-12 -8 -4
4 8 12
x
-4
-8
-12

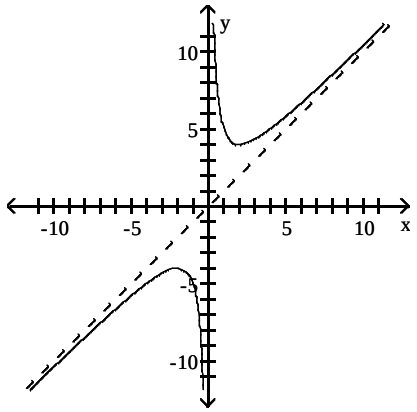
90)



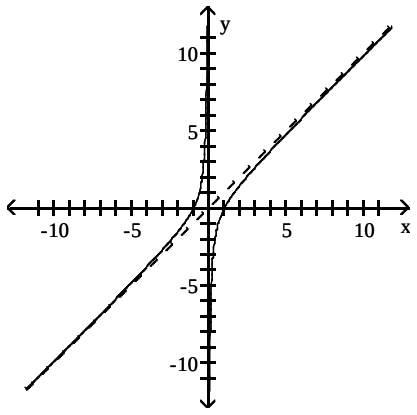
91) Yes

92) y = x

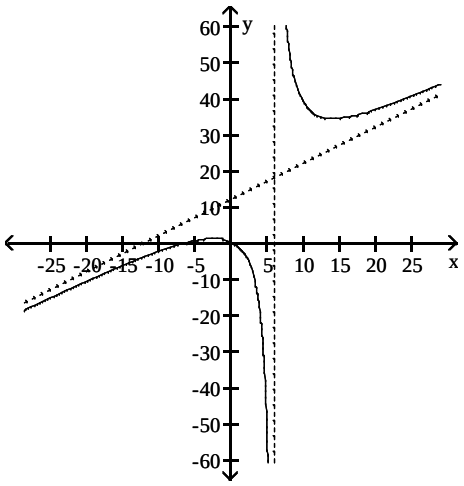
93)



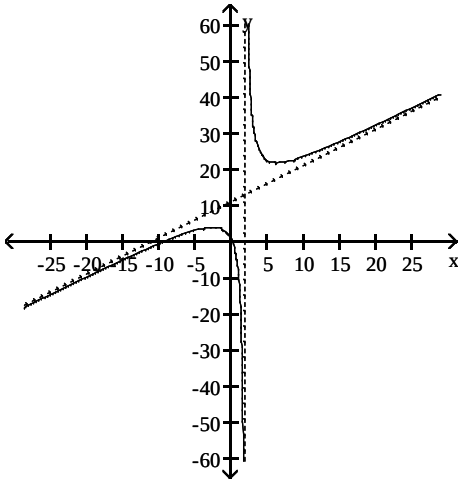
94)



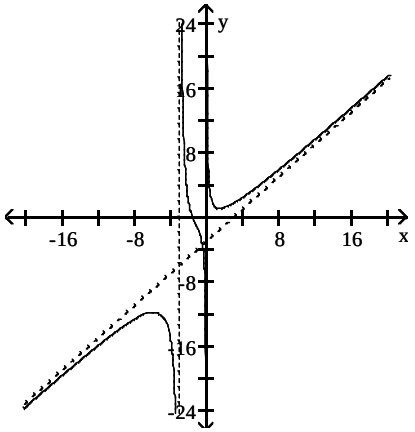
95)


y
x
60
50
40
30
20
10
-10
-20
-30
-40
-50
-60
-25 -20 -15 -10 -5 5 10 15 20 25

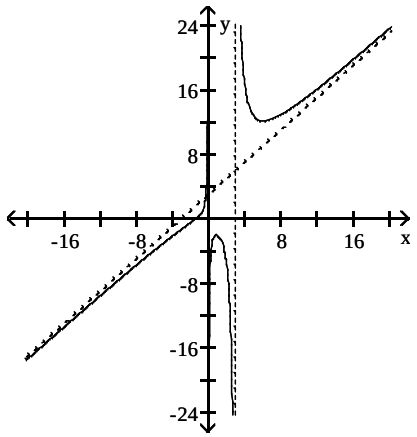
96)


y
x
60
50
40
30
20
10
-10
-20
-30
-40
-50
-60
-25 -20 -15 -10 -5 5 10 15 20 25

97)


y
x
24
16
8
-8
-16
-24
-16 -8 8 16

98)



99) y = x
100) y = x + 11
101) y = x + 13
102) no slant asymptote
103) no slant asymptote
104) y = x – 16
105) y = x – 12
106) y = x
107) y = x
108) y = x – 4
109) y = x – 2
110) Yes
111) No
112) No
113) No
114) No
115) Yes
116) Yes
117) Yes
118) Yes
119) No
120) No
121) No
122) No
123) No