Pág. 303

1. $-5,\ -4,\ -3,\ -2,\ -1,\ 0,\ 1$
2. $h-6$

Pág. 305

1. $f(4)\quad 3\ ;\ f(5)\quad 5$
2. $f(1)\quad 3\ ;\ f(\ 1)\quad \frac{1}{3}\ ;\ f(5)\quad 1$
3. $f(\ 2)\quad \frac{1}{4}\ ;\ f(\ 1)\quad 1\ ;\ f(1)\quad 1\ ;\ f(2)\quad \frac{1}{4}$
4. $f(\ 2)\quad 6\ ;\ f(\ 1)\quad 4;\ f(0)\quad 2;\ f(1)\quad 0;\ f(2)\quad 2;\ f\cdot(3)\quad 4;\ f(4)\quad 6$

Pág. 306

1. $f(x)\quad 5\quad 2x$
2. $f(x)\quad 3x^2$
3. $f(x)\quad \frac{3}{(x\quad 2)^2}$
4. $f(x)\quad 3x^2\quad 2x$

Pág. 308

1. $f(x)\quad 6x\quad 6$
2. $f(x)\quad \frac{1}{2\sqrt{x}}\quad \frac{1}{3\sqrt[3]{x^2}}$
3. $f(x)\quad \frac{1}{\sqrt{2x}}\quad \frac{5}{3\sqrt[3]{25x^2}}$
4. $f(x)\quad \frac{3}{2x^2\sqrt{x}}$
5. $f(x)\quad \cos^2 x\quad sen^2 x$
6. $f(x)\quad \frac{1}{\cos^2 x}$
7. $f(x)\quad e^x(1\quad x)$
8. $f(x)\quad 2^x(1\quad x\ln 2)$
9. $f(x)\quad 2x\log_2 x\quad \frac{x^2\quad 1}{x\ln 2}$
10. $f(x)\quad \frac{4x}{(x^2\quad 1)^2}$
11. $f(x)\quad 2x\quad 3\quad \frac{3}{x^2}$
12. $f(x)\quad \frac{1\quad \ln 10\ \log x}{\ln 10\quad x^2}$

Pág. 309

13. $f(x)\quad (2x\quad 5)\cos(x^2\quad 5x\quad 7)$
14. $f(x)\quad \frac{10}{3\sqrt[3]{5x\quad 3}}$
15. $f(x)\quad 3(\cos^2(3x\quad 1)\quad sen^2(3x\quad 1))$
16. $f(x)\quad \frac{2\log x}{x}$
17. $f(x)\quad 3\ sen(3x\quad\ )$
18. $f(x)\quad \frac{1}{\sqrt{1\quad 2x}}$
19. $f(x)\quad e^{2x\ 1}(1\quad 2x)$
20. $f(x)\quad \frac{2x(1\quad x^2)\ \cos(x^2\quad 1)\quad x\ sen(x^2\quad 1)}{(1\quad x^2)\sqrt{1\quad x^2}}$

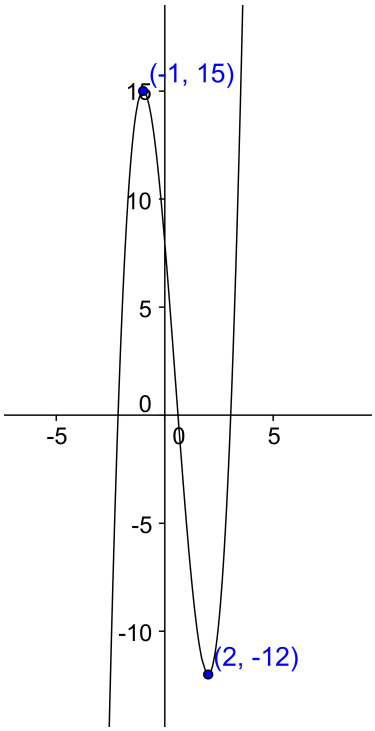
Pág. 310

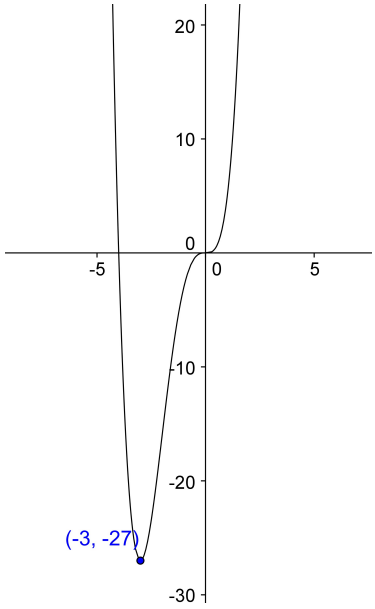
1. $f(x) \quad 3x^2 \quad 8x$ a) $f(\ 1) \quad 11$; $f(1) \quad 5$; $f(3) \quad 3$

b) $y \quad 4 \quad 11(x \quad 1) \quad y \quad 2 \quad 5(x \quad 1) \quad y \quad 8 \quad 3(x \quad 3)$

c) $x \quad 0 \; y \; x \quad \frac{8}{3}$ d) $f(2) \quad 2 \quad 0 \quad f(x)$ *es decreciente en* $x \quad 2$

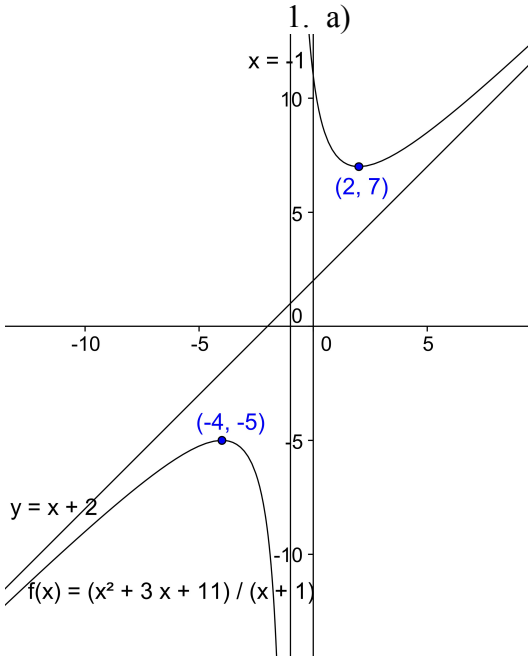
Pág. 313 1.a) 1. b) 1.c)

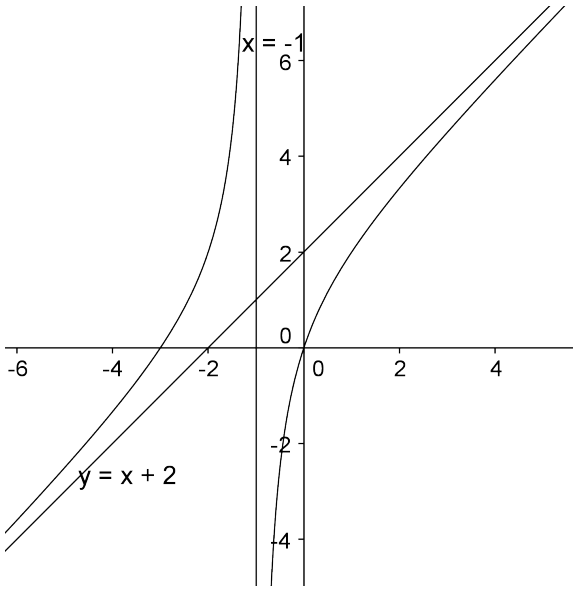




Pág. 315 1. b)

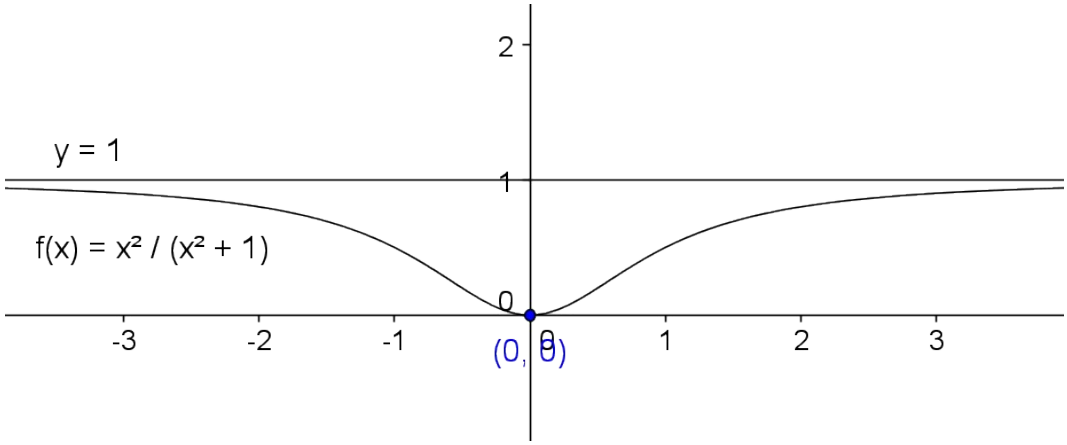
1. a)



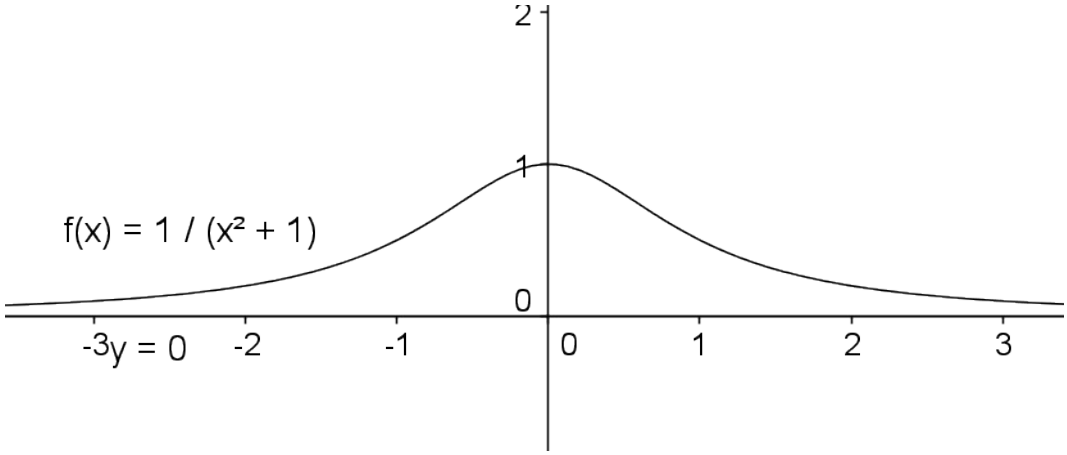


Pág. 315

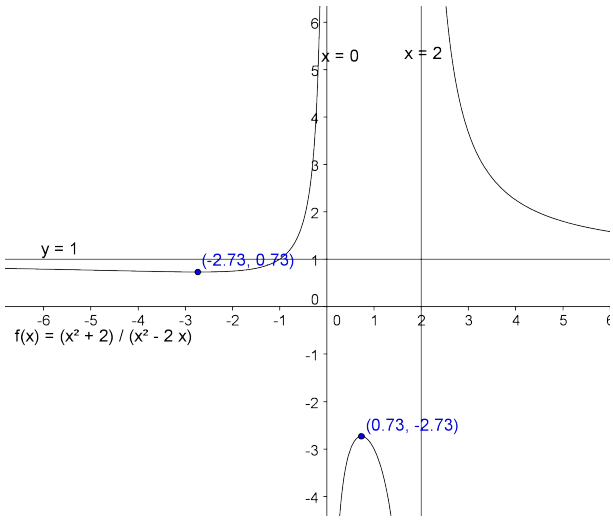
1. c)



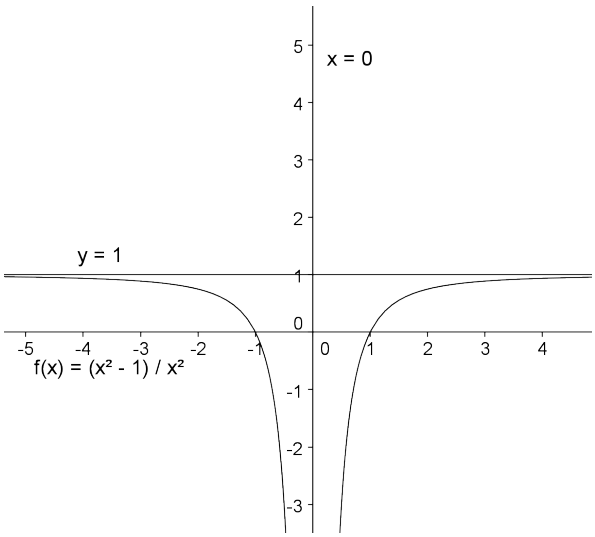
1. d)



1. e)



1. f)



Pág. 320

1. a) 1 b) $\frac{3}{2}$ c) $\frac{1}{3}$

2. a) $\frac{1}{3}$, decrece b) 1 , decrece c) 3 , crece d) 3 , crece

3. $4+h$ 4. $3-h$, 2 y 2,5. Crece más en el intervalo [3 , 4]

5. Para $f(x)$: $T.V.M.\ 2,3$ 19 y $T.V.M.\ 3,4$ 37
   Para $g(x)$: $T.V.M.\ 2,3$ 18 y $T.V.M.\ 3,4$ 54
   En [2 , 3] crece más $f(x)$ y en [3 , 4] $g(x)$.

6. $f(\ 2)\ \ f(3)\ \ \frac{2}{5}$

7. a) 6 b) 12 c) - 3 d) $\frac{1}{9}$

8. $f(1)\ \ 4$; $f(3)\ \ 0$ 9. -9 10. 0

12. $f(\ 3)\ \ 3$; $f(0)\ \ \frac{3}{2}$; $f(4)\ \ 2$

13. $f(\ 2)\ \ f(2)\ \ 0$; $f(1)\ \ 0$; $f(3)\ \ 0$

14. No, siempre es positiva. $f(\ 2)\ \ f(0)\ \ f(2)$

15. $f(x)\ \ 6x^2\ \ 6x$; $f(1)\ \ 12$

16. $f(x)\ \ 2\ sen\ (2x\ \ )$; $f(0)\ \ 0$

17. $f(x)\ \ \frac{1}{3}$; $f(\ \frac{17}{3})\ \ \frac{1}{3}$

18. $f(x)\ \ \frac{7}{7x\ \ 1^{\ 2}}$; $f(0)\ \ 7$

19. $f(x)\ \ \frac{1}{2}\cos\frac{x}{2}\ \ \frac{1}{2}\ sen\ \frac{x}{2}$; $f(\ \ )\ \ \frac{1}{2}$

20. $f(x)\ \ \frac{6}{x\ \ 3^{\ 4}}$; $f(\ 1)\ \ \frac{3}{8}$

21. $f(x)\ \ \frac{3x^2}{2}\ \ 3x\ \ \frac{1}{2}$; $f(2)\ \ \frac{23}{2}$

22. $f(x)\ \ \frac{1}{2\sqrt{(x\ \ 4)^3}}$; $f(8)\ \ \frac{1}{16}$

23. $f(x)\ \ sen\ (\ \ x)\ \ x\cos(\ \ x)$; $f(\frac{}{2})\ \ 1$

24. $f(x)\ \ 15\ (5x\ \ 2)^2$; $f(\frac{1}{5})\ \ 15$

25. $f(x)\ \ \frac{10}{x\ \ 5^{\ 2}}$; $f(3)\ \ \frac{5}{2}$

26. a) $f(x)\ \ \frac{e^x\ \ e^{\ x}}{2}$ b) $f(x)\ \ 6x(x^2\ \ 3)^2$

27. a) $f(x)\ \ 1\ \ \ x\ \ 0$ b) $f(x)\ \ \frac{x}{\sqrt{x^2\ \ 1}}$

Pág. 321

28. a) $f'(x) = \dfrac{2}{3\sqrt[3]{x^6}}$ b) $f'(x) = \dfrac{\cos x}{2\sqrt{\operatorname{sen} x}}$

29. a) $f'(x) = \dfrac{3x}{\sqrt{(1-x^2)^3}}$ b) $f'(x) = 7^{x-1}e^{-x}(\ln 7 - 1)$

30. a) $f'(x) = \dfrac{1}{3x^2} - \dfrac{1}{3}$ b) $f'(x) = \dfrac{1}{x} - \dfrac{e^{\sqrt{x}}}{2\sqrt{x}}$

31. a) $f'(x) = \dfrac{2x(1-x^2)}{(1-x^2)^3}$ b) $f'(x) = e^{2x}(1-\operatorname{tg} x)^2$

32. a) $f'(x) = \dfrac{x^3-3x^2}{(x-1)^3}$ b) $f'(x) = \cos x\,(e^{\operatorname{sen} x} - 2\operatorname{sen} x)$

33. a) $f'(x) = \dfrac{x^3-12x}{2(x^2-4)\sqrt{x(x^2-4)}}$ b) $f'(x) = \dfrac{x^2e^{1-x}(3-x)}{8}$

34. a) $f'(x) = 0$ b) $f'(x) = \dfrac{2}{x\ln 10} - \dfrac{1}{(3-x)\ln 10}$

35. a) $f'(x) = \dfrac{6x\operatorname{tg}^2 x^2}{\cos^2 x^2}$ b) $f'(x) = \dfrac{1}{2x\sqrt{\ln x}}$

36. a) $f'(x) = \dfrac{2x}{\sqrt{9-x^4}}$ b) $f'(x) = \dfrac{2x}{1-(x^2-1)^2}$

37. a) $f'(x) = \dfrac{1}{x\sqrt{x^2-1}}$ b) $f'(x) = \dfrac{1}{\sqrt{x}(4-x)}$

38. a) $f'(x) = \dfrac{1}{2(1-x^2)\sqrt{arctg\, x}}$ b) $f'(x) = \dfrac{e^{-x}}{\sqrt{1-e^{-2x}}}$

39. a) $f'(x) = \dfrac{2\sqrt{x}-1}{4\sqrt{x^2-x\sqrt{x}}}$ b) $f'(x) = \dfrac{1}{1-x^2}$

40. a) $\dfrac{1}{3}, \dfrac{2}{3}$ b) $(-1,2)\ (1,-2)$

41. a) $(2,0)$ b) $(-3,-1)\ (-7,3)$

42. a) $(2,0)$ b) $(-1,-1)\ (-3,3)$

c) $(-2,4)$ d) $\dfrac{3}{4}, \ln 2$

43. a) $(2,-3)$ b) $\dfrac{5}{2}, \dfrac{25}{4}$

c) $(-\sqrt{2},-4)\ (0,0)\ (\sqrt{2},-4)$ d) $(0,1)$

44. $y = 2 - x$ 45. $y = 2 - 4(x-1)$

46. $y = 2 - 2(x-1)$ 47. $y = 1 - \dfrac{1}{2}x$

Pág. 321

48. a) Mín. relativo en $\frac{1}{3}, \frac{14}{3}$

b) Mín. relativo en $(1,0)$ Máx. relativo en $(0,1)$

c) $(0,0)$ ni máximo ni mínimo, mín. relativo en $(3, 27)$

d) Mín. relativo en $(2, 16)$ Máx. relativo en $(2,16)$

49. a) Mín. relativo en $(1,2)$ Máx. relativo en $(1, 2)$

b) Mín. relativo en $(0,0)$

Pág. 322

51. Crecientes: 15, 17, 21, 23, 24
Decrecientes: 18, 19, 20, 22, 25
Punto singular, ni crece ni decrece 16.

52. a) Creciente en b) Decreciente en

c) Decreciente en $\frac{3}{2}$, creciente en $\frac{3}{2}$,

d) Creciente en 1, decreciente en 1,

e) Creciente en

f) Creciente en 1 $(1,)$, decreciente en $1, 1$

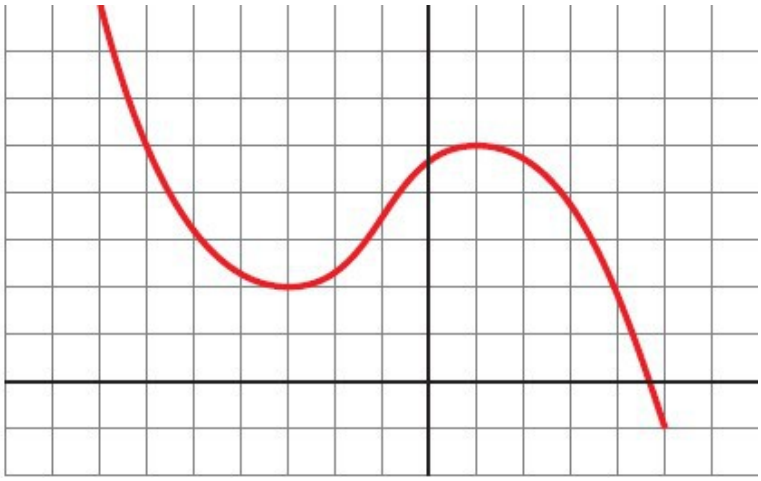
53. a) $f(x) \ 0 \ si \ x \ 1, \ f(x) \ 0 \ si \ x \ 1$

b) $f(x) \ 0 \ si \ x \ 0, \ f(x) \ 0 \ si \ x \ 0$

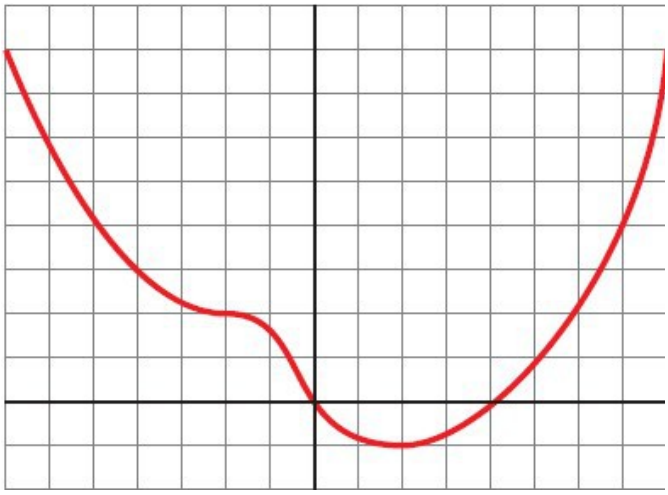
c) $f(x) \ 0 \ si \ x \ 1 \ o \ x \ 1, \ f(x) \ 0 \ si \ 1 \ x \ 1$

54. Creciente en 1 $(3,)$, decreciente en $1, 3$
Mín. relativo en $(3, 4)$ Máx. relativo en $(1, 8)$

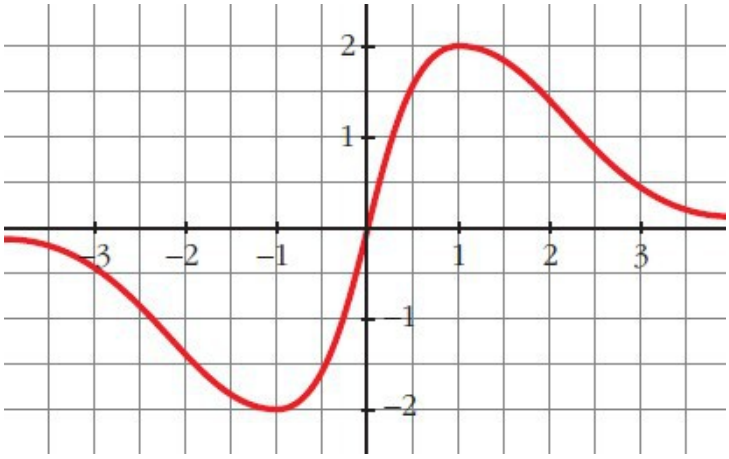
55. Mín. relativo en $(3, 2)$
Máx. relativo en $(1, 5)$



56.

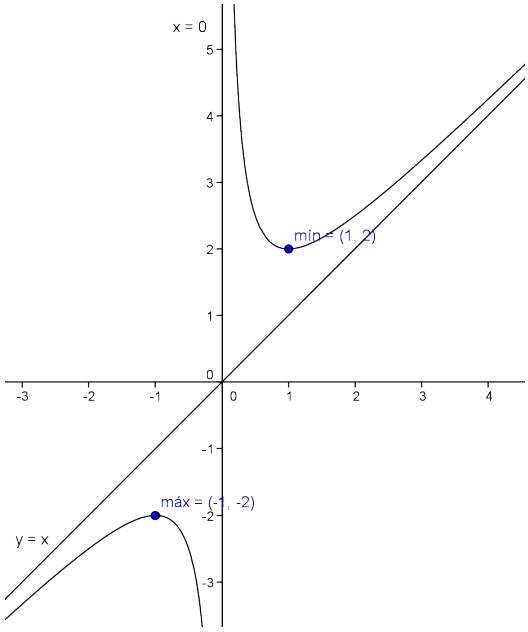


57.

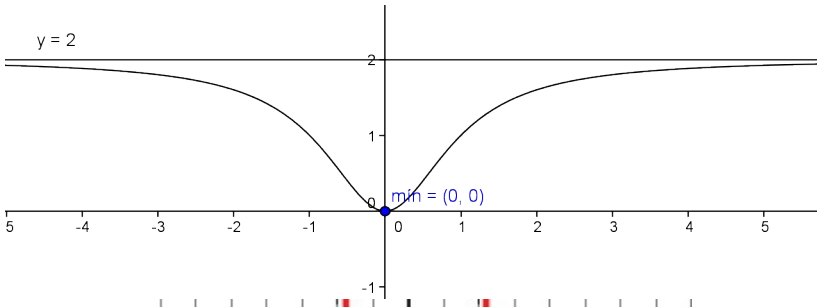


58. El punto $(1, 0)$ no es máximo ni mínimo, la función es creciente en .

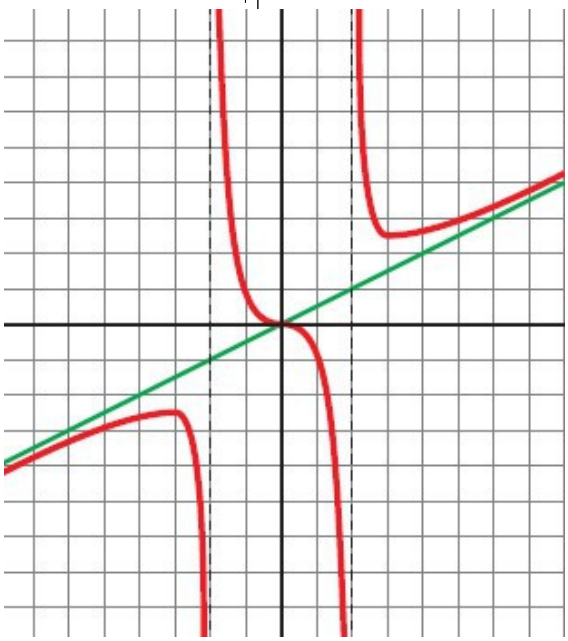
59.



60.



61.



Pág. 323

62. 8.640 € los dos primeros años, 3.538,94 € entre el 4º y el 6º y 1.449,55 € entre el 8º y el 10º. La depreciación no es constante.

63. $y \quad 6(x \quad \sqrt{3})$, $y \quad 6(x \quad \sqrt{3})$

64. $y \quad 4(x \quad 2)$, $y \quad 4(x \quad 2)$

65. a) $f(x) \quad 2$ b) $x \quad 4$ c) En el punto $(4, \quad 3)$

66. En $(2,0)$ y $(\quad 2,0)$

67. $y \quad 4 \quad 2(x \quad 2)$, $y \quad 2x$

68. $(\quad 1, 4)$ y $(3, \quad 28)$

69. $(1,1)$ y $(\quad 1, \quad 1)$. La tangente no es horizontal en ningún punto.

70. $f(2) \quad \frac{4}{3}$, $f(2) \quad 3$

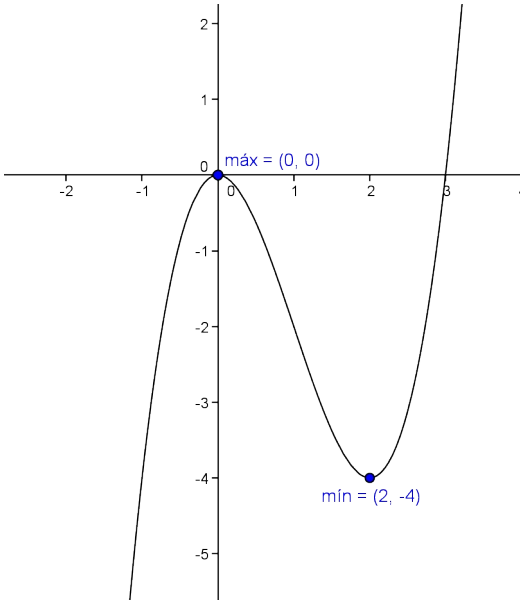
71. a) $f(x) \quad \frac{4x}{x^4 \quad 1}$ b) $f(x) \quad \frac{1}{2x} \quad \frac{x}{x^2 \quad 1}$

c) $f(x) \quad \frac{1}{x} \quad 1$ d) $f(x) \quad \frac{6x \quad 5}{x(3x \quad 5)\ln 10}$

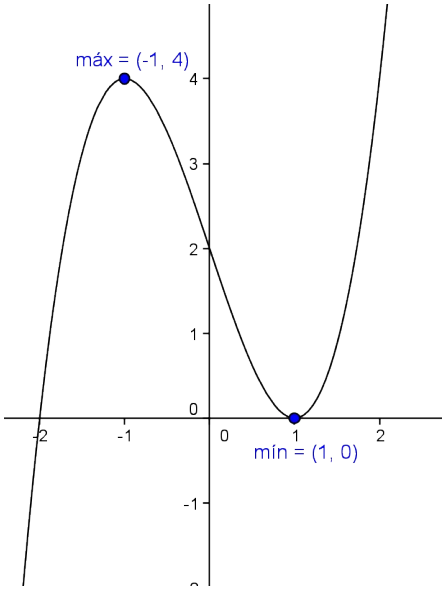
e) $f(x) \quad \frac{2}{sen\,x \cos x}$ f) $f(x) \quad \ln x \quad 1$

Pág. 323

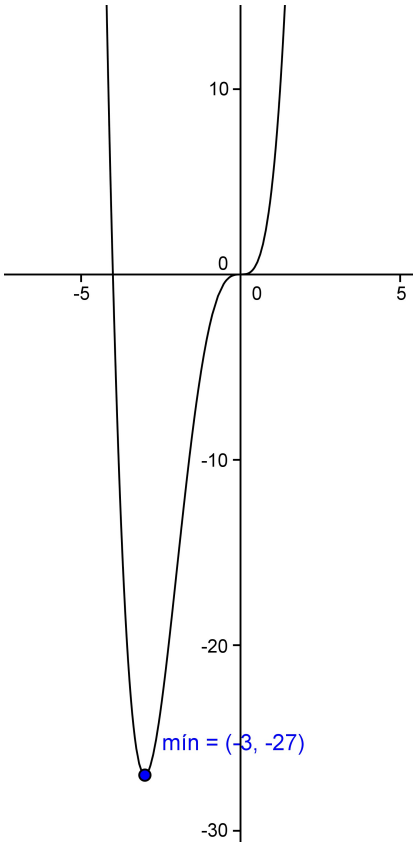
72. a



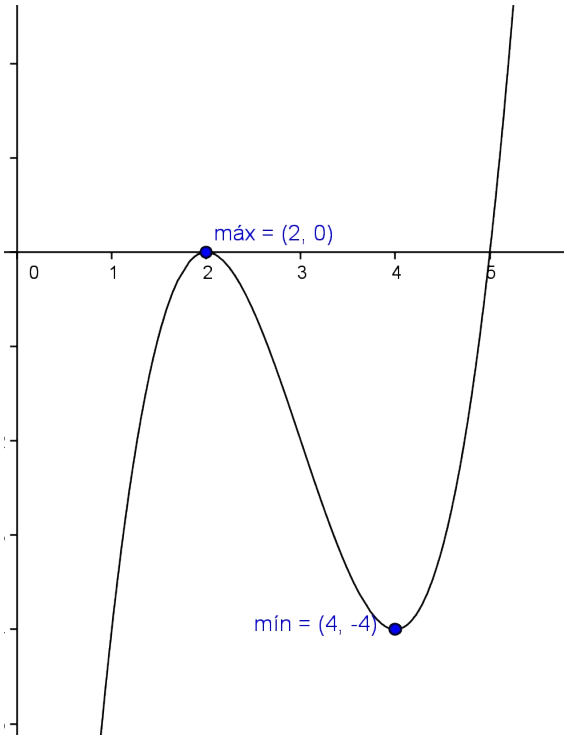
72. b



72. c

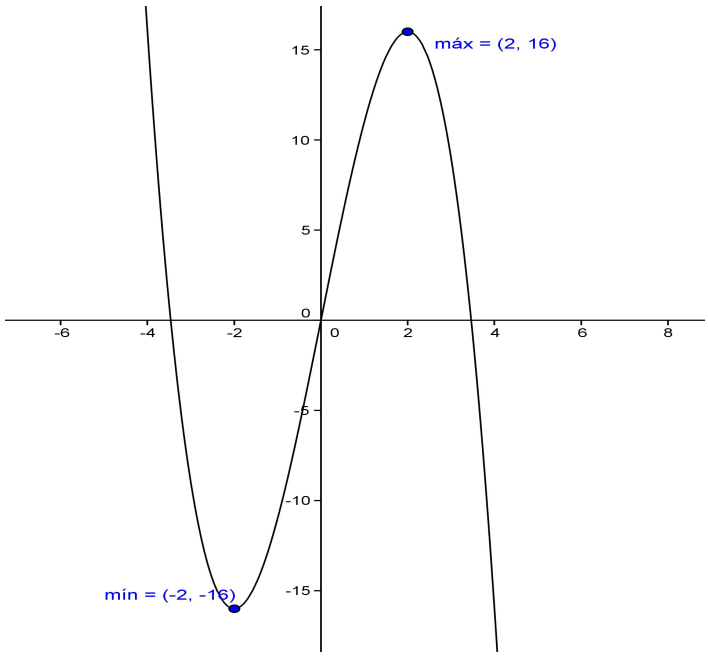


72. d

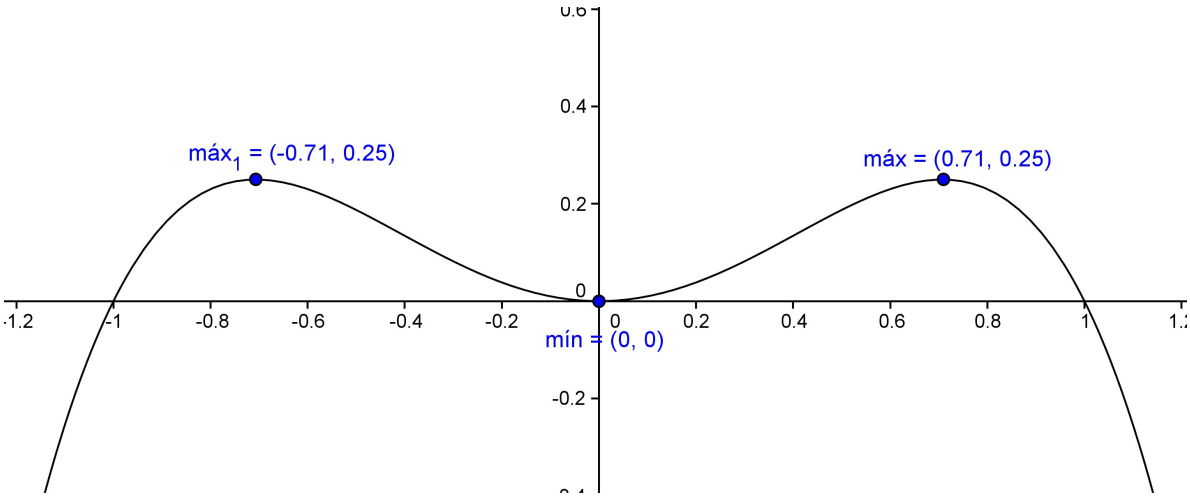


Pág. 323

72. e

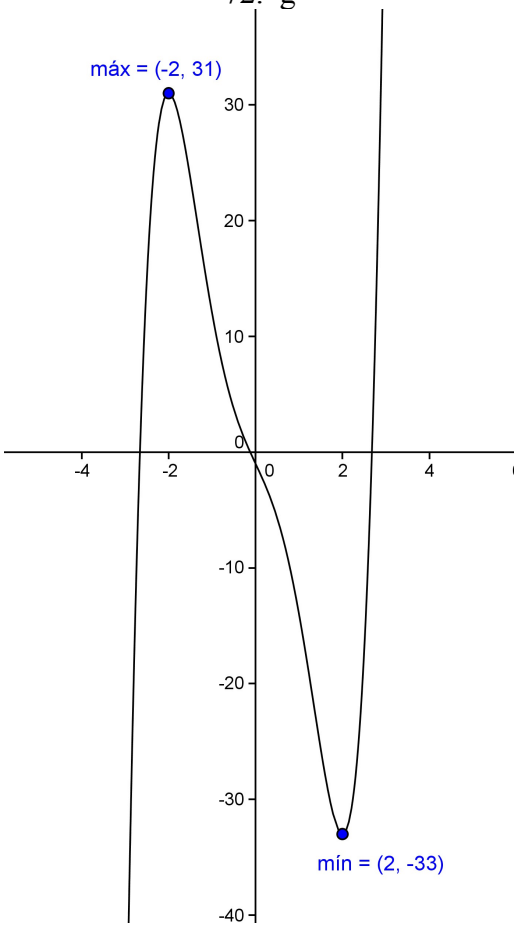


72. f

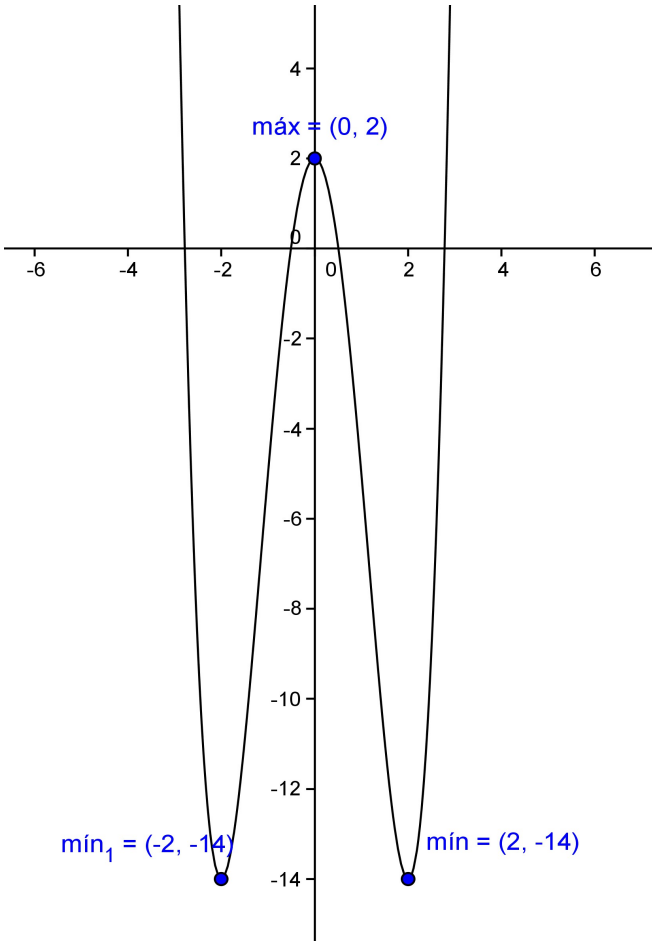


Pág. 323

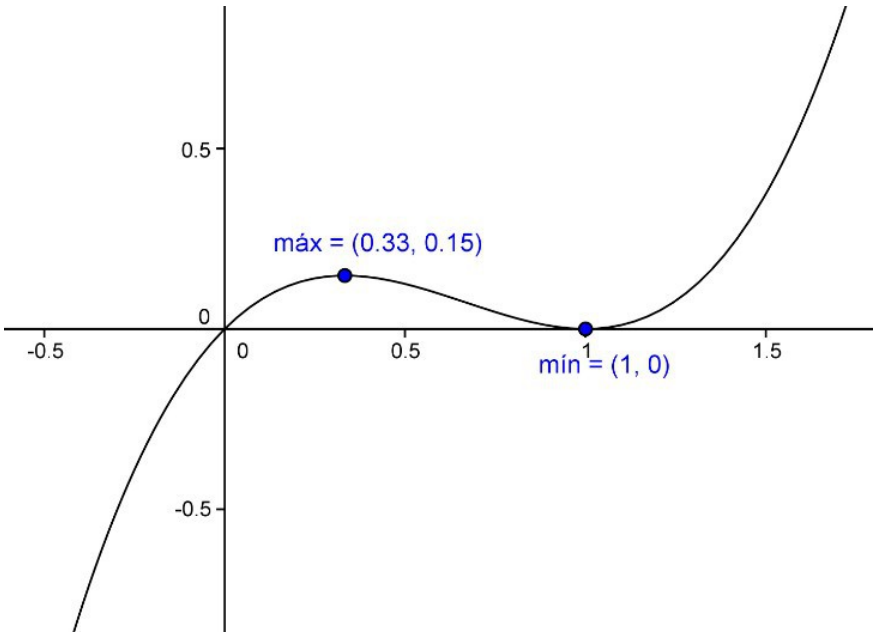
72. g



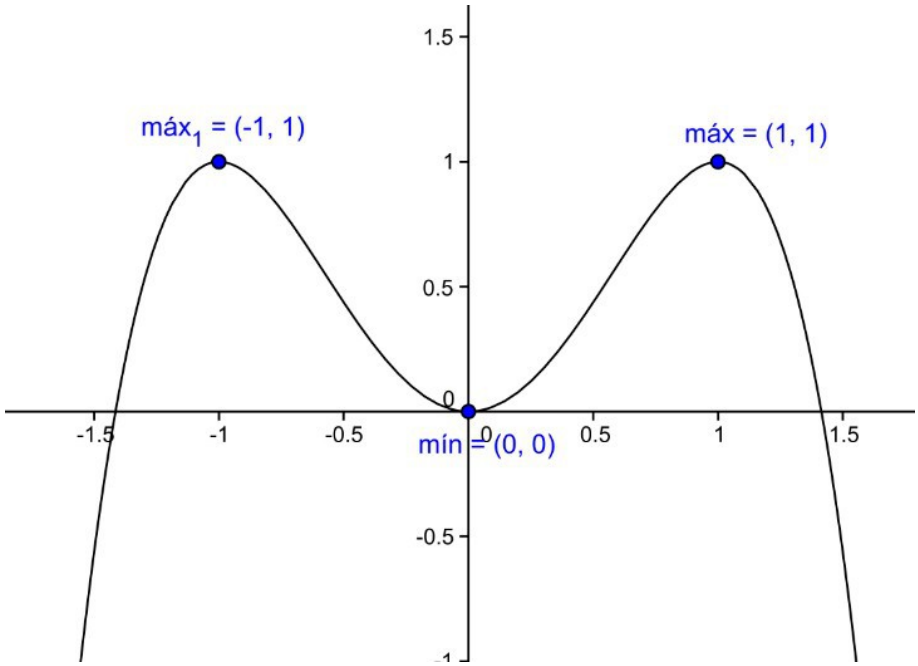
72. h



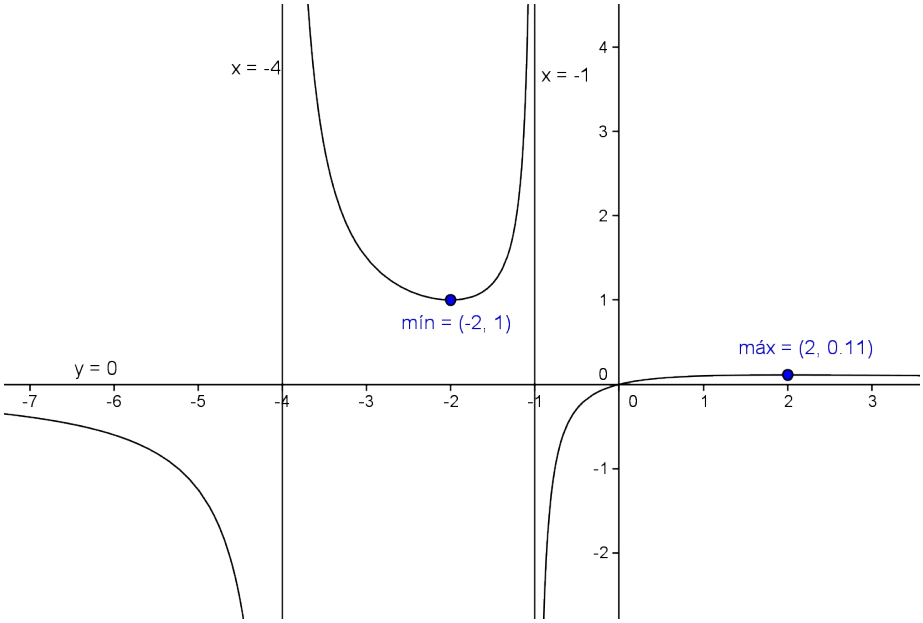
73. a



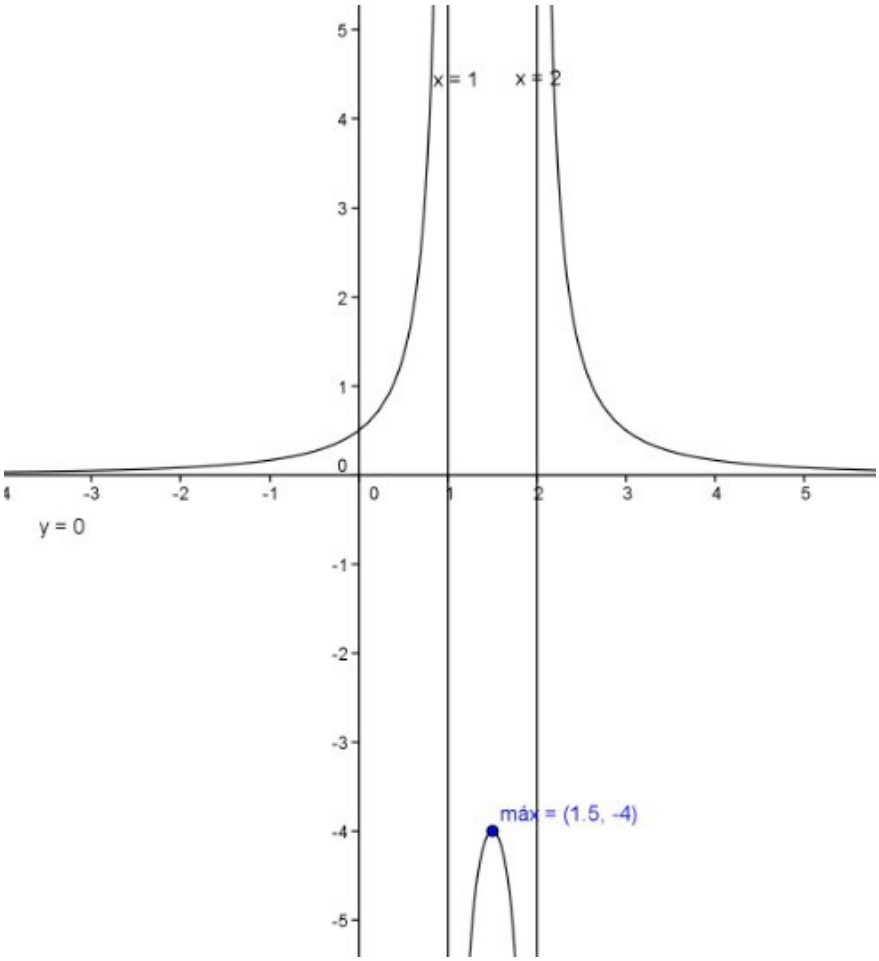
73. b


máx$_1$ = (-1, 1)
máx = (1, 1)
mín = (0, 0)
1.5
1
0.5
0
-0.5
-1.5
-1
-0.5
0
0.5
1
1.5

73. c

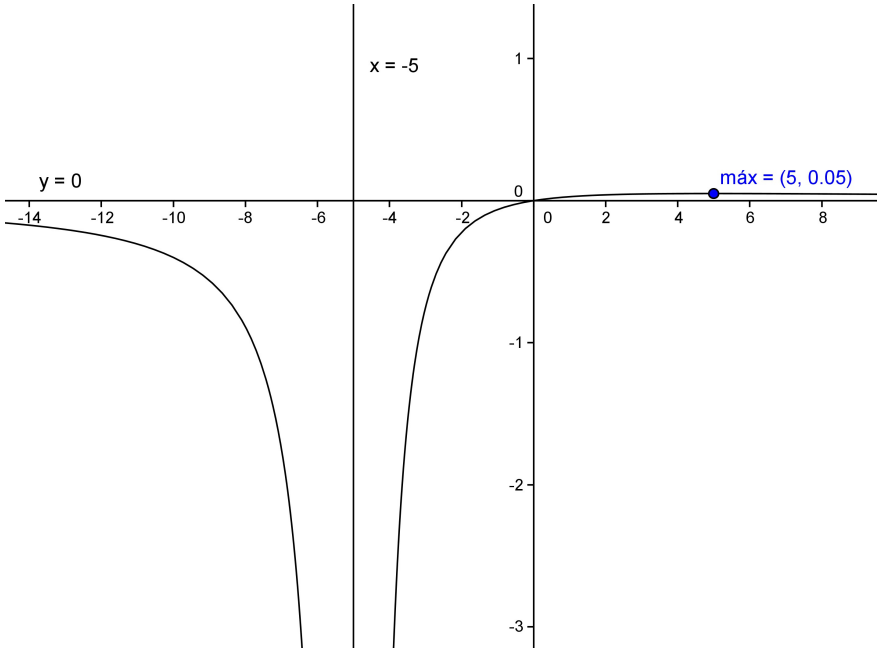

x = -4
x = -1
mín = (-2, 1)
máx = (2, 0.11)
y = 0
4
3
2
1
0
-1
-2
-7
-6
-5
-4
-3
-2
-1
0
1
2
3

73. d

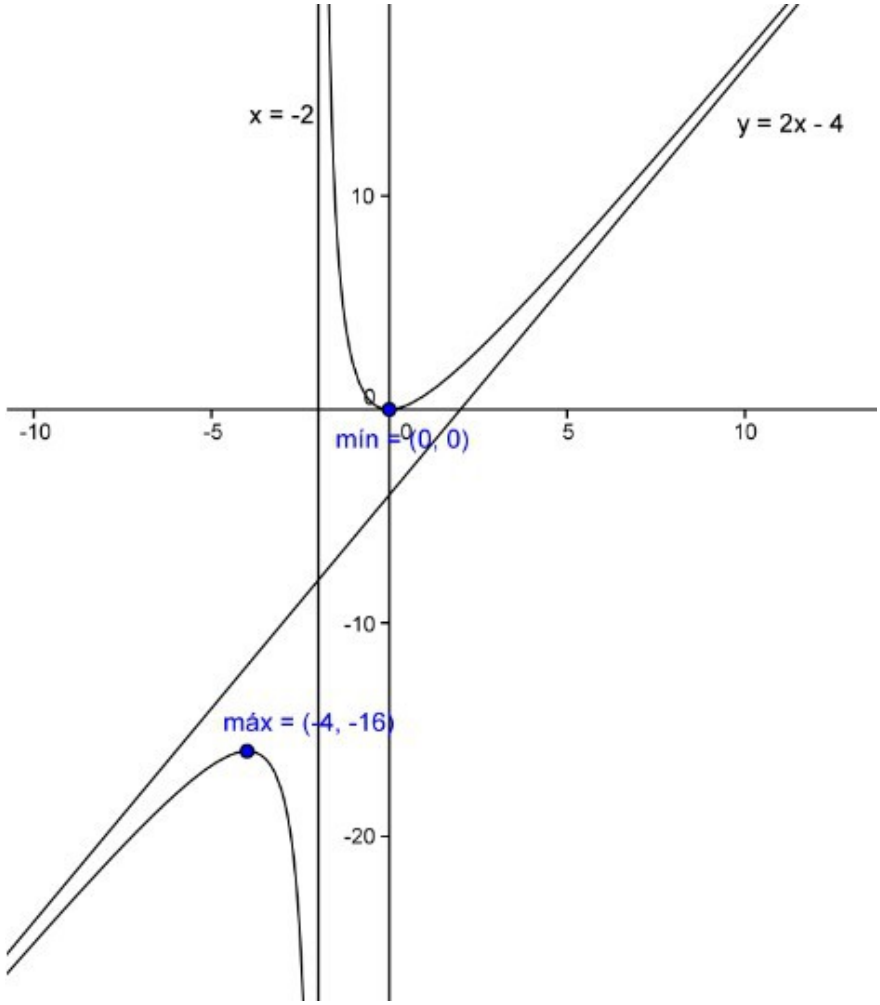


Pág. 323

73. e

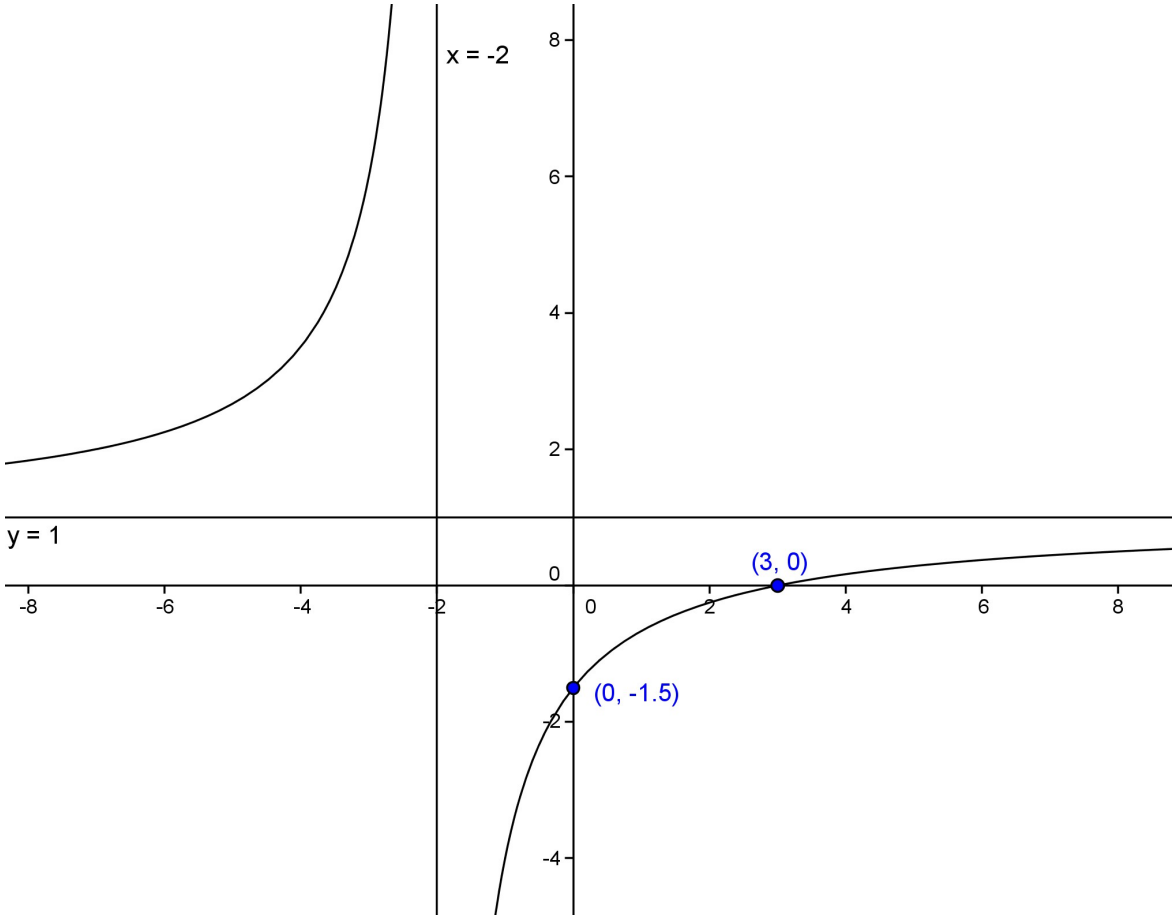


73. f

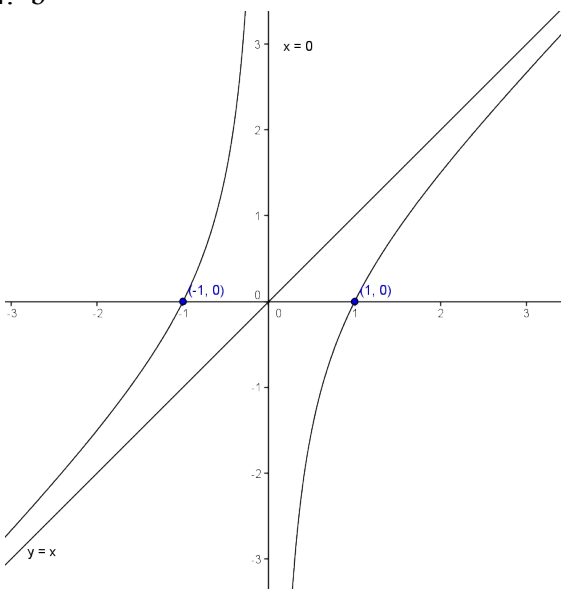


Pág. 324

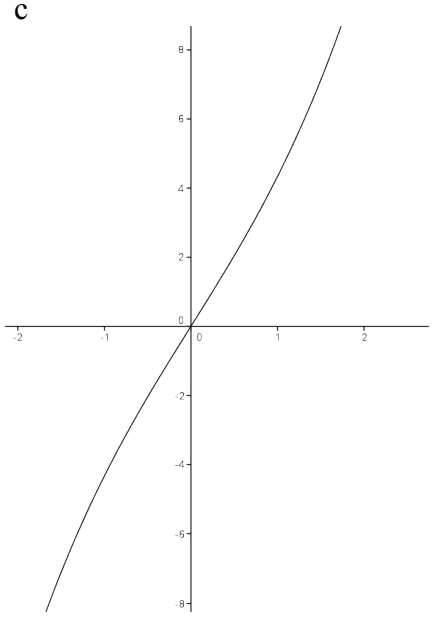
74. a

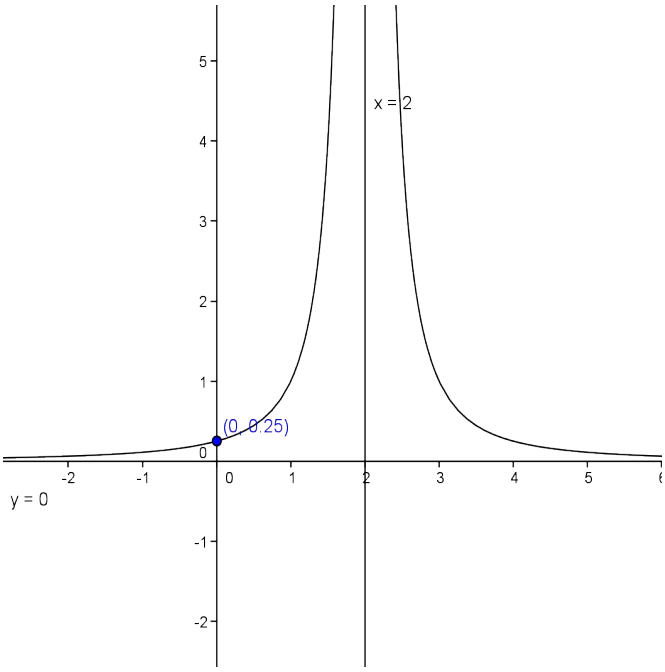


74. b



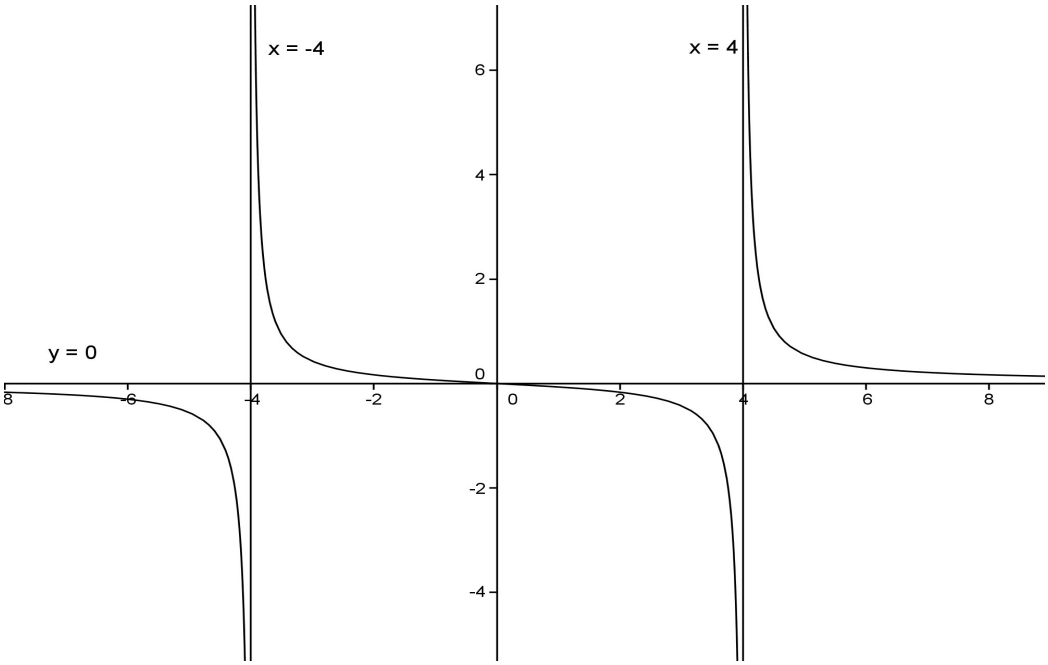
74. c



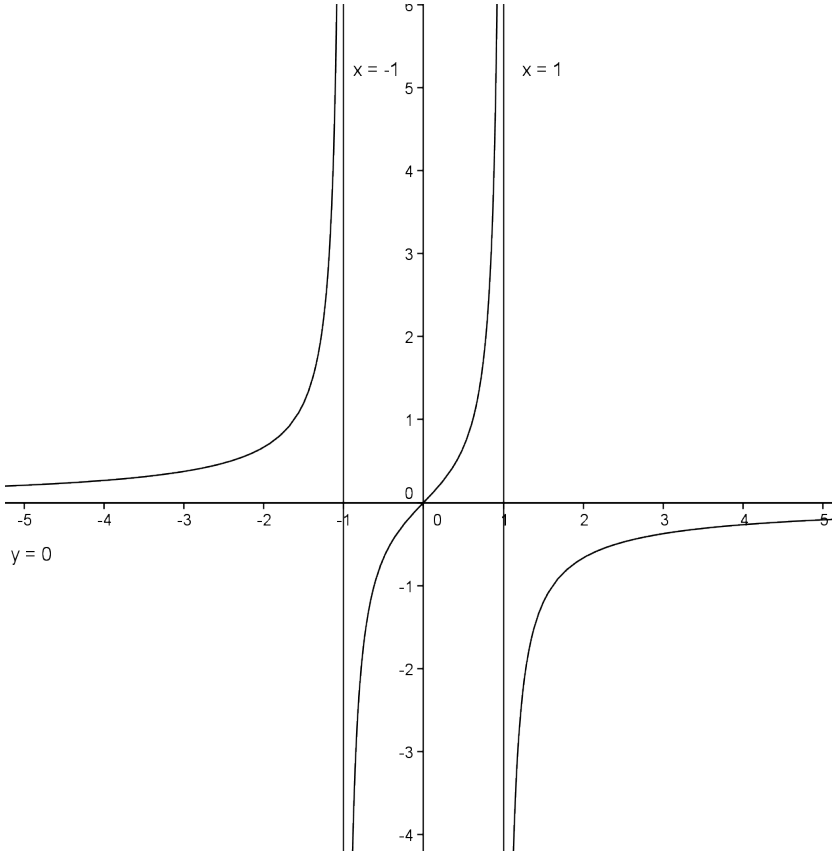


74. d

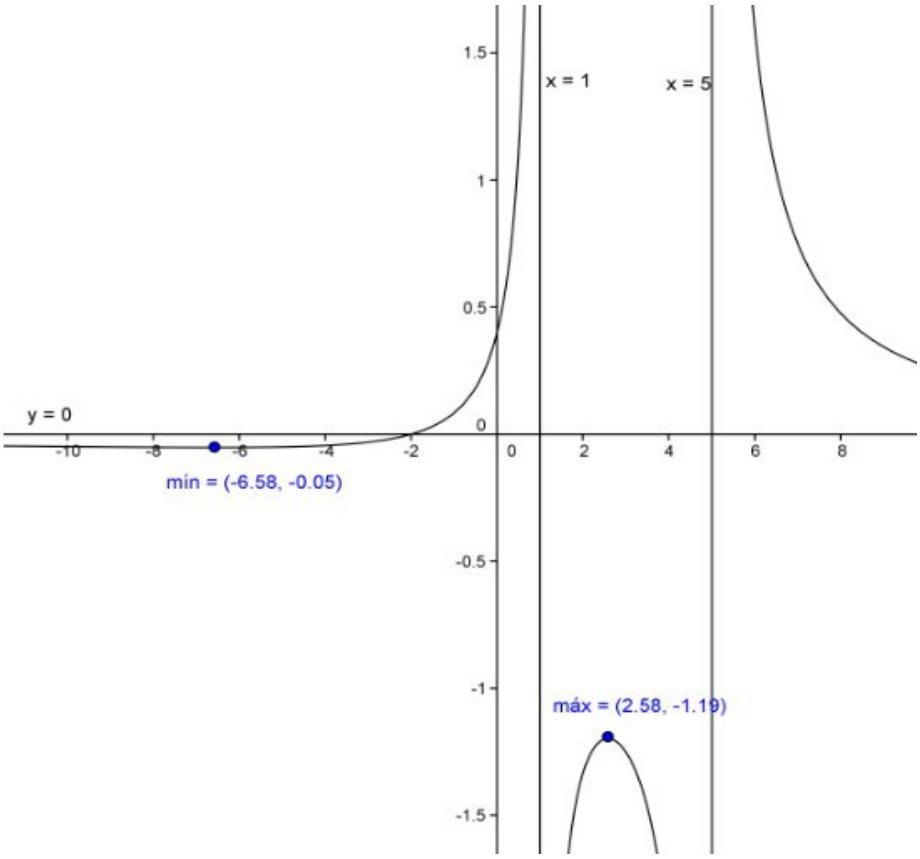
75. a



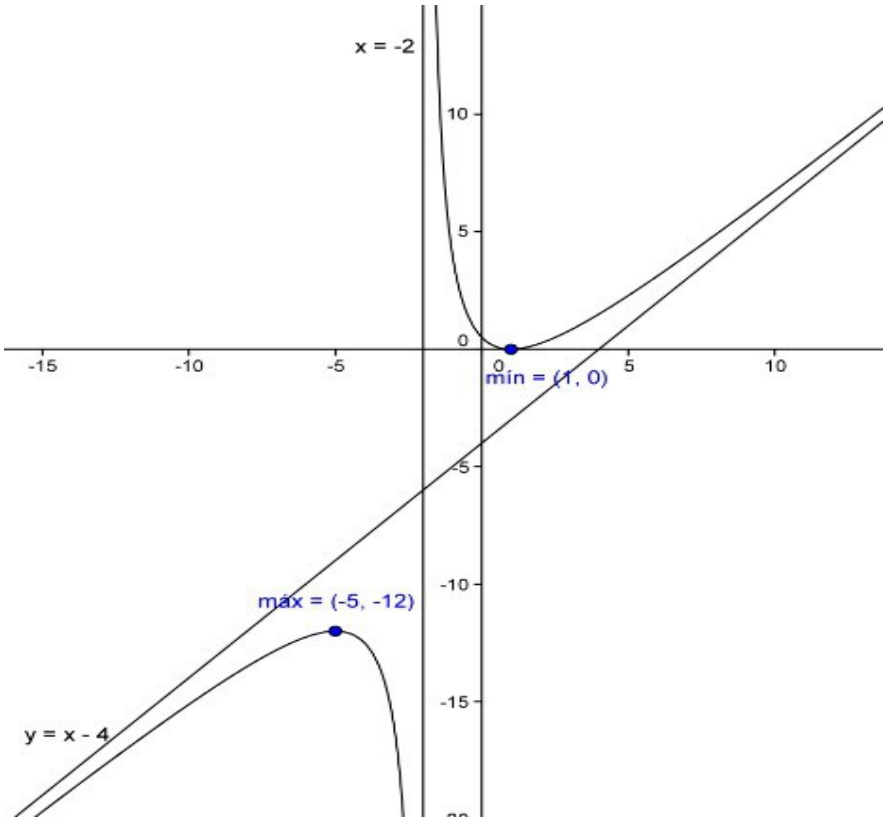
75. b



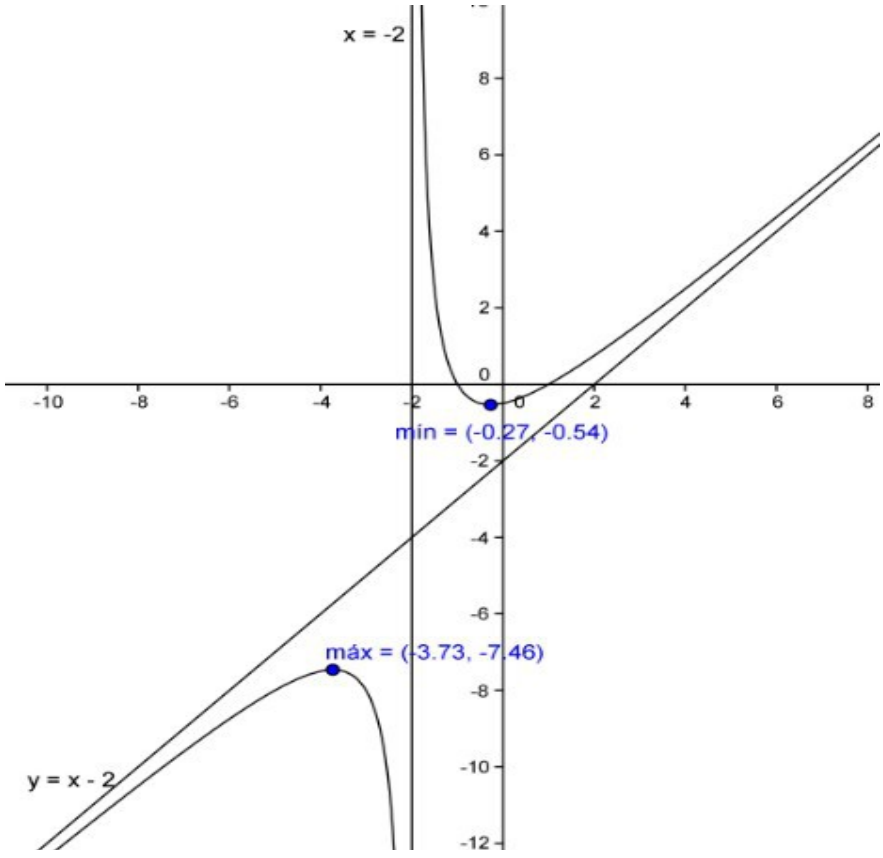
75. c

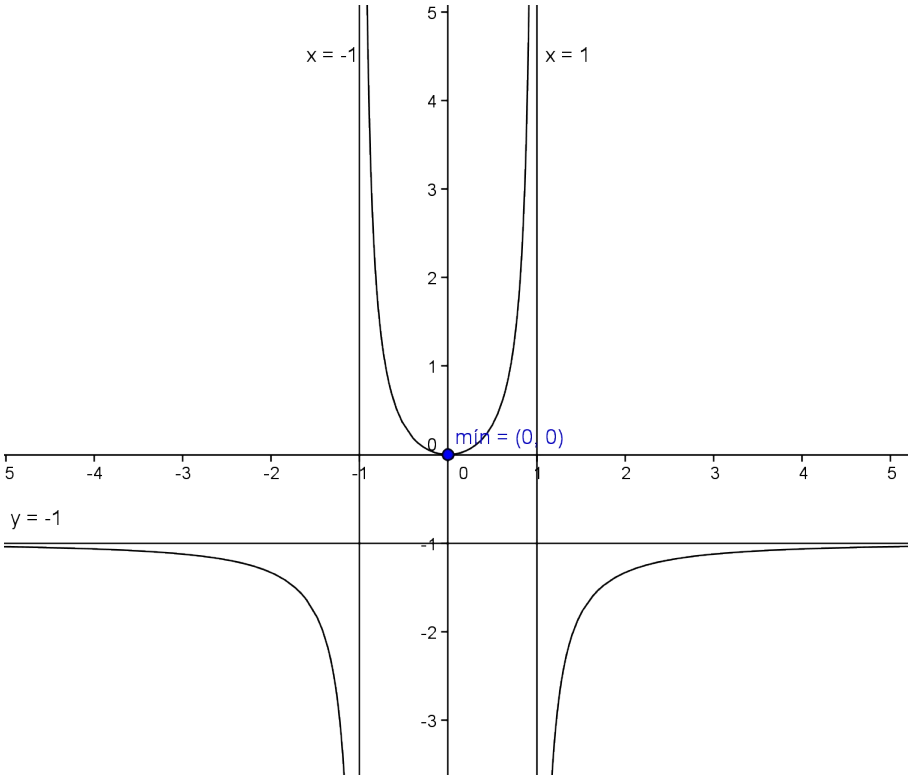


75. d


x = -2
10
5
0
-15
-10
-5
0
5
10
min = (1, 0)
-5
-10
máx = (-5, -12)
-15
y = x - 4

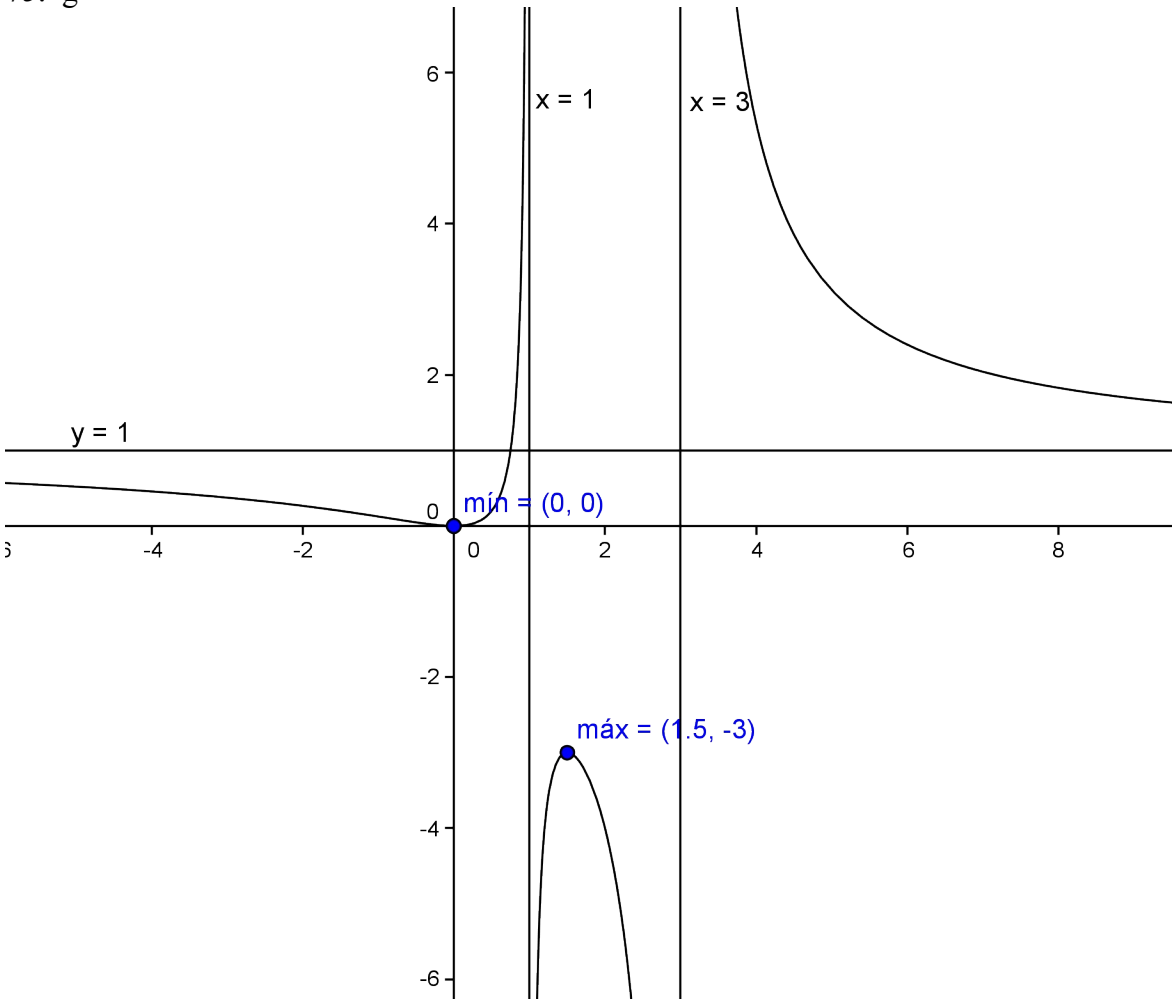
75. e


x = -2
8
6
4
2
0
-10
-8
-6
-4
-2
0
2
4
6
8
min = (-0.27, -0.54)
-2
-4
-6
máx = (-3.73, -7.46)
-8
-10
-12
y = x - 2

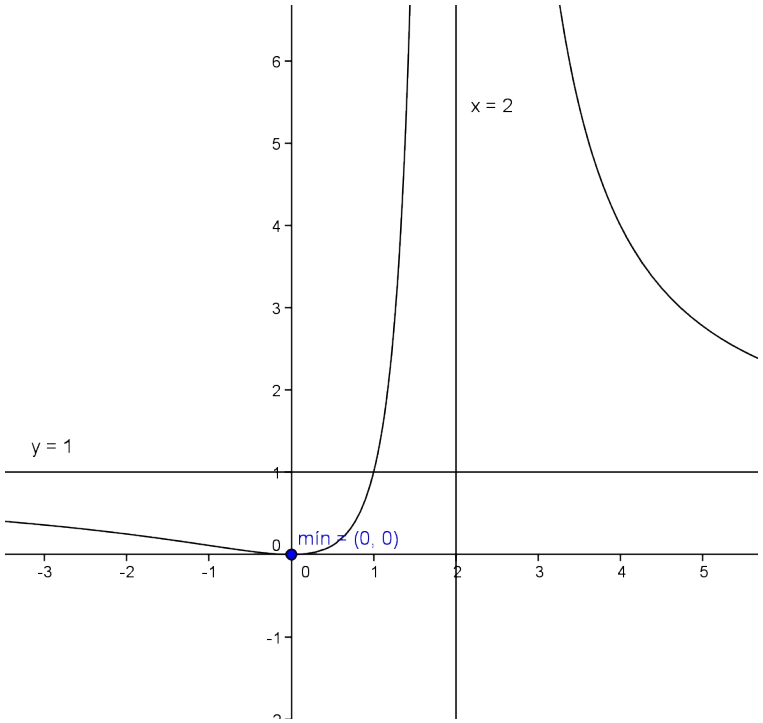


75. f

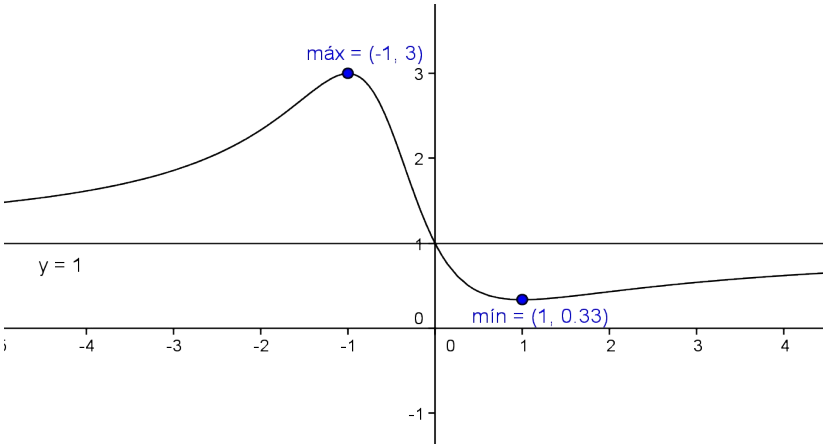
75. g



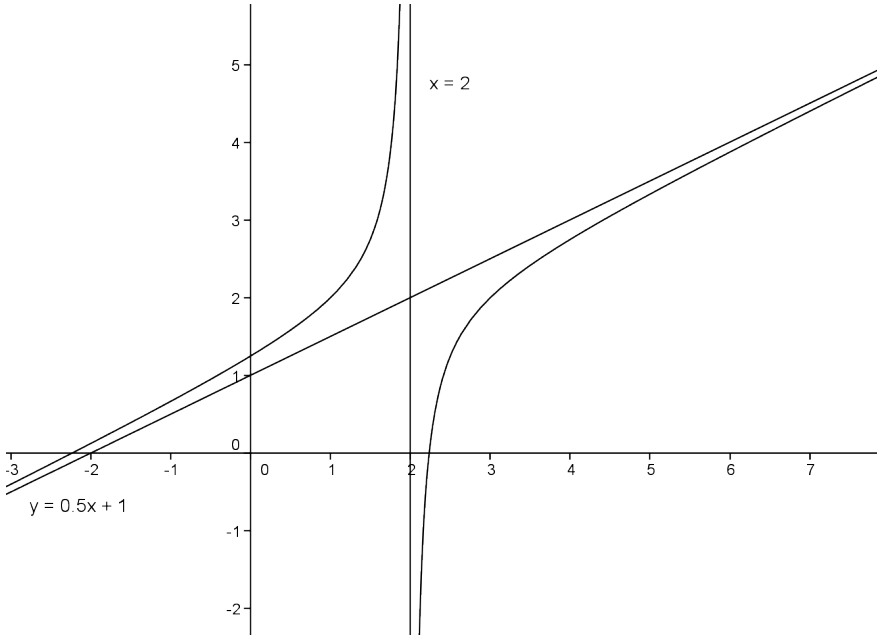
75. h



75. i



75. j



Pág. 324

76. $f(x) \quad \frac{1}{2}x^2 \quad 2x \quad 1$

77. Vértice $(\quad 3 , 2)$

78. $f(x) \quad x^2 \quad 6x \quad 7$

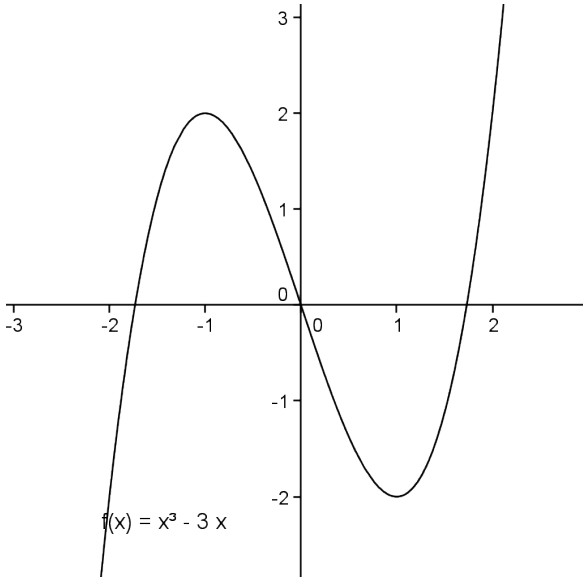
79 $y \quad 10x \quad 7, \quad y \quad 10x \quad 4$

80. $a = 6, \ b = 0, \ c = -6$

81. $k = 1$

82. $T.V.M. \ 1 , 3 \quad 3 \quad T.V.M. \ 1,3$. Son iguales porque siempre es 3, es una recta.

83.



84. $f(x) \quad x^2 \quad C, \quad C$

85. Porque la pendiente a la curva (derivada) en el punto (0 , 0) es cero.

86. $f(x) \quad g(x) \quad C, \quad x \quad$ y $\quad f(x) \quad g(x) \quad \frac{1}{3} \quad x$

87. En el punto $\frac{3}{2}, \frac{15}{4}$

88. $y \quad 2ax \quad b \quad 0 \quad x \quad \frac{b}{2a}$

89. Solo b.

90. No, es siempre decreciente.

Pág. 325

91. $f(x) \quad \frac{1}{2\sqrt{x}}$

92. $y \quad 3x \quad 1 \quad \ln 3$

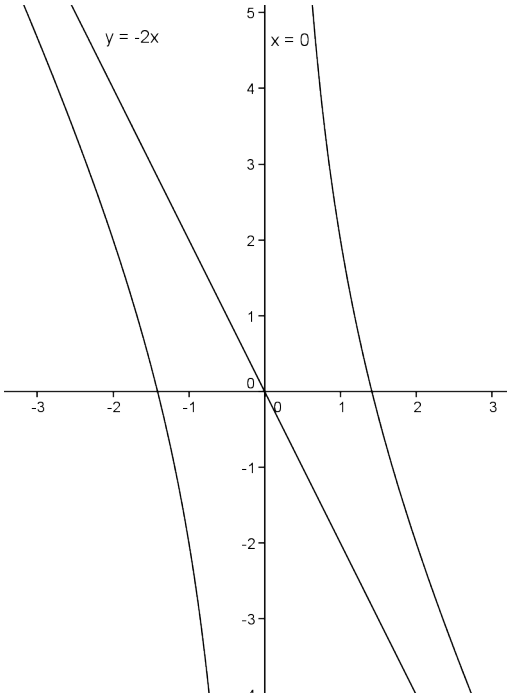
93. El seno tiene máximo en $(\frac{}{2} , 1)$ y mínimo en $(\frac{3}{2} , \quad 1)$

El coseno tiene máximo en $(0 , 1)$ y $(2 \quad , 1)$ y mínimo en $(\quad , \quad 1)$

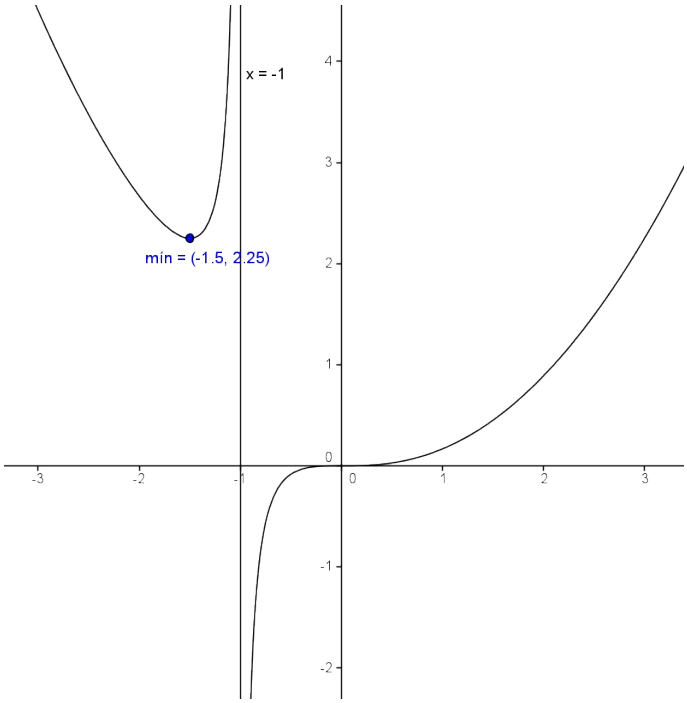
94. No, porque su derivada es $f(x) \quad \frac{1}{\cos^2 x}$

Pág. 325

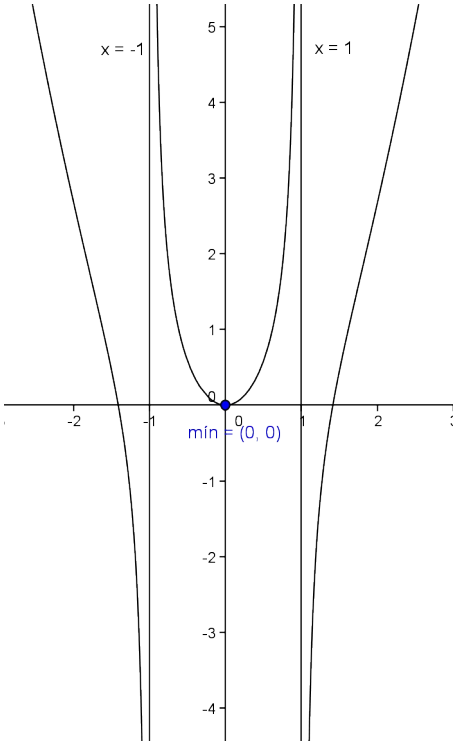
95. a



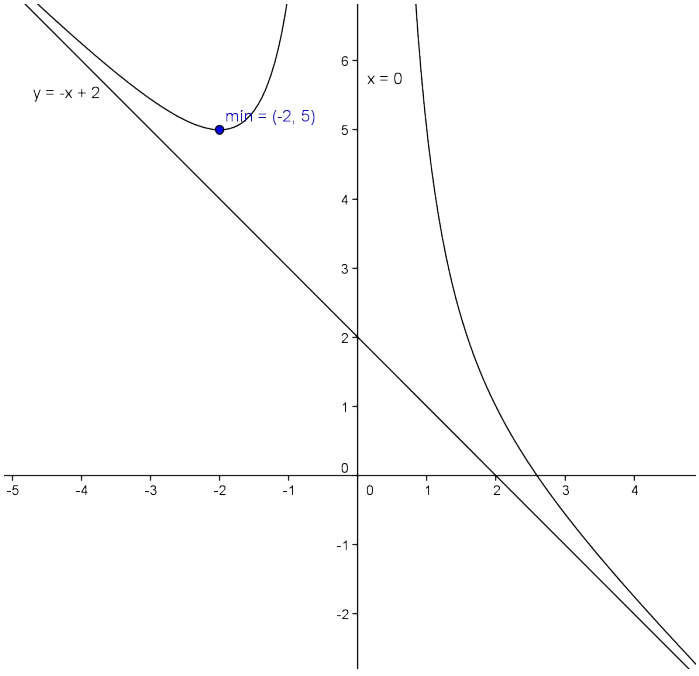
95. b



95. d



95. c



96. a) 5 unidades b) $C(5)$ 175, $M(5)$ 35

97. b) A los 3 años 10.000 € de beneficio.
c) No, pero los beneficios serán cada vez menores.