

SOLUTION KEY

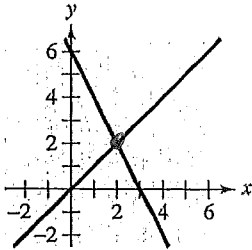
Sheet 322: Graphing and Solving Systems

PC 5th Ch. 7-1, p. 551.

*Substitution or elimination OK.

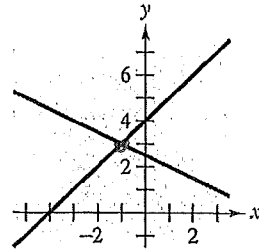
In Exercises 5-14, solve the system by the method of substitution. Check your solution graphically.

5. $\begin{cases} 2x + y = 6 \\ -x + y = 0 \end{cases}$



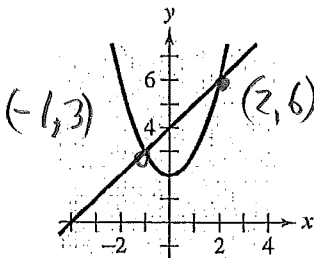
(2, 2)

6. $\begin{cases} x - y = -4 \\ x + 2y = 5 \end{cases}$



(-1, 3)

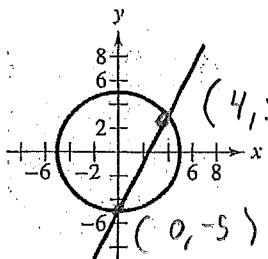
7. $\begin{cases} x - y = -4 \\ x^2 - y = -2 \end{cases}$



(-1, 3)

(2, 6)

9. $\begin{cases} -2x + y = -5 \\ x^2 + y^2 = 25 \end{cases}$

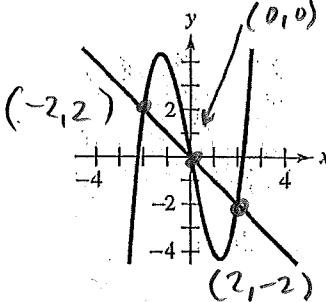


(4, 3)

(0, -5)

SOLUTION

10. $\begin{cases} x + y = 0 \\ x^3 - 5x - y = 0 \end{cases}$



(-2, 2)

(2, -2)

SOLUTION

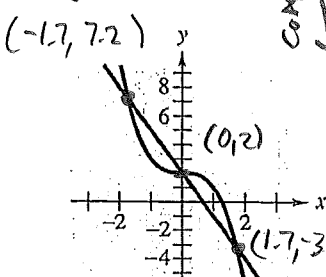
5. $\begin{cases} 2x + y = 6 & (1) \\ -x + y = 0 & (2) \end{cases}$
 $3x = 6 \quad (1)-(2)$
 $\begin{cases} x = 2 \\ y = 2 \end{cases}$

6. $\begin{cases} x - y = -4 & (1) \\ x + 2y = 5 & (2) \end{cases}$
 $y = x + 4$
 $y = (5 - x)/2$
 $x + 4 = (5 - x)/2$
 $2x + 8 = 5 - x$
 $3x = -3$
 $\begin{cases} x = -1 \\ y = 3 \end{cases}$

8. $\begin{cases} 3x + y = 2 & (1) \\ x^3 - 2 + y = 0 & (2) \end{cases}$
 $x^3 - 3x - 2 = -2 \quad (1)-(2)$
 $x^3 - 3x = 0$
 $x(x^2 - 3) = 0$
 $x = 0 \quad y = 2$
 $\begin{cases} x = \sqrt{3} \\ y = 2 - 3\sqrt{3} \end{cases} \quad \begin{cases} x = -\sqrt{3} \\ y = 2 + 3\sqrt{3} \end{cases}$
 $(-1.732, 2.196) \quad (1.732, -3.196)$
 and $(0, 2)$

7. $\begin{cases} x - y = -4 & (1) \\ x^2 - y = -2 & (2) \end{cases}$
 $y = x + 4$
 $y = x^2 + 2$
 $x^2 + 2 = x + 4$
 $x^2 - x - 2 = 0$
 $(x - \frac{1}{2})^2 - \frac{1}{4} - 2 = 0$
 $(x - \frac{1}{2})^2 = \frac{9}{4}$
 $x - \frac{1}{2} = \pm \frac{3}{2}$
 $x = 2 \quad y = 6$
 $x = -1 \quad y = 3$

8. $\begin{cases} 3x + y = 2 & (1) \\ x^3 - 2 + y = 0 & (2) \end{cases}$



(-1.7, 7.2)

(0, 2)

9. $\begin{cases} -2x + y = -5 & (1) \\ x^2 + y^2 = 25 & (2) \end{cases}$
 $y = 2x - 5$
 $x^2 + (2x - 5)^2 = 25$
 $x^2 + 4x^2 - 20x + 25 = 25$
 $5x^2 - 20x = 0$
 $5x(x - 4) = 0$
 $\begin{cases} x = 0 \\ y = -5 \end{cases} \quad \begin{cases} x = 4 \\ y = 3 \end{cases}$

10. $\begin{cases} x + y = 0 & (1) \\ x^3 - 5x - y = 0 & (2) \end{cases}$
 $x^3 - 4x = 0$
 $x(x^2 - 4) = 0$
 $\begin{cases} x = 0 \\ y = 0 \end{cases} \quad \begin{cases} x = 2 \\ y = -2 \end{cases} \quad \begin{cases} x = -2 \\ y = 2 \end{cases}$

THREE FUNCTIONS
 $y_1 = 2x - 5$
 $y_2 = \sqrt{25 - x^2}$
 $y_3 = -y_2$
 THAT CAN BE GRAPHED
 (4, 3)

CIRCLE
 IMPLICIT: $x^2 + y^2 = R^2$
 EXPLICIT
 FUNCTION S.
 $y = \text{SOMETHING}$

(-1, 3), (2, 6), (0, -5), (4, 3), (0, 0), (-2, 2), (2, -2)

(2, 4), (3, -14), (-5)

TI-84+
 M6 ellipse

Zoom SQUARE GRAPHICAL EXPANSION

In Exercises 43–50, use a graphing utility to approximate all points of intersection of the graphs.

44.

$(-0.490, -6.530)$

43. $\begin{cases} y = e^x \\ x - y + 1 = 0 \end{cases}$

44. $\begin{cases} y = -4e^{-x} \\ y + 3x + 8 = 0 \end{cases}$

45. $\begin{cases} x + 2y = 8 \\ y = \log_2 x \end{cases} \rightarrow y = \log_2(x) = \frac{\log(x)}{\log(2)} = \frac{\ln(x)}{\ln(2)}$

$\begin{cases} y_1 = -0.5x + 4 \\ y_2 = \log(x)/\log(2) \end{cases}$
 (4, 2) check: $\log_2(4) = 2$ because $4 + 2(2) = 8$ ✓

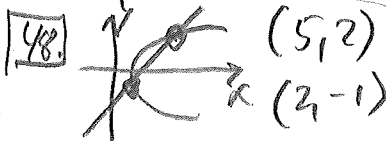
46. $\begin{cases} y = -2 + \ln(x - 1) \\ 3y + 2x = 9 \end{cases}$ 46. (5.309, -0.539)

47. $\begin{cases} y = \sqrt{x} \\ y = x \end{cases}$

48. $\begin{cases} x - y = 3 \\ x - y^2 = 1 \end{cases}$ (5, 2), (2, -1)

49. $\begin{cases} x^2 + y^2 = 169 \\ x^2 - 8y = 104 \end{cases}$ circle + parabola

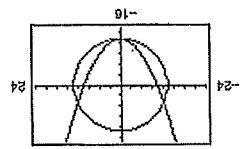
50. $\begin{cases} x^2 + y^2 = 4 \\ 2x^2 - y = 2 \end{cases}$ circle + parabola
 (0, -2), $(\sqrt{2}/2, 3/2)$



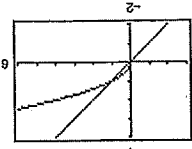
Solve: $2y^2 + y - 6 = 0$
 $(2y - 3)(y + 2) = 0$
 $y = 3/2$ or $y = -2$
 $x = \pm\sqrt{2}/2$ or $x = 0$

CONIC SECTIONS CAN HAVE IMPLICIT EQUATIONS, NOT EXPLICIT LIKE $y = \dots$

(0, -13), (12, 5)



(4, 2)



(0, 1)

In Exercises 51–62, solve the system graphically or algebraically. Explain your choice of method.

51. $\begin{cases} y = 2x \\ y = x^2 + 1 \end{cases}$

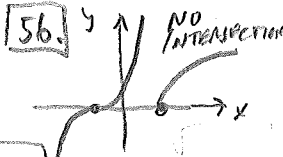
52. $\begin{cases} x + y = 4 \\ x^2 + y = 2 \end{cases}$ No solution

53. $\begin{cases} 3x - 7y + 6 = 0 \\ x^2 - y^2 = 4 \end{cases}$ Hyperbola

54. $\begin{cases} x^2 + y^2 = 25 \\ 2x + y = 10 \end{cases}$ (3, 4), (5, 0)

55. $\begin{cases} x - 2y = 4 \\ x^2 - y = 0 \end{cases}$

56. $\begin{cases} y = (x + 1)^3 \\ y = \sqrt{x - 1} \end{cases}$ No solution

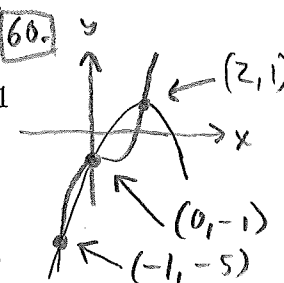


57. $\begin{cases} y - e^{-x} = 1 \\ y - \ln x = 3 \end{cases}$

58. $\begin{cases} x^2 + y = 4 \\ e^x - y = 0 \end{cases}$

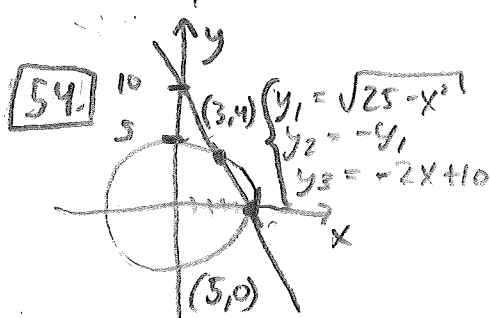
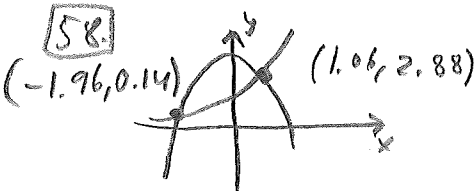
59. $\begin{cases} y = x^4 - 2x^2 + 1 \\ y = 1 - x^2 \end{cases}$

60. $\begin{cases} y = x^3 - 2x^2 + x - 1 \\ y = -x^2 + 3x - 1 \end{cases}$



61. $\begin{cases} xy - 1 = 0 \\ 2x - 4y + 7 = 0 \end{cases}$ Hyperbolic function

62. $\begin{cases} x - 2y = 1 \\ y = \sqrt{x - 1} \end{cases}$ (2, 5), (0, 1)



61. $(\frac{1}{2}, 2), (-4, -\frac{1}{4})$ 63. 192 units 65. 3133 units
 57. (0.287, 1.75) 59. (-1, 0), (0, 1), (1, 0)
 51. (1, 2) 53. (-2, 0), $(\frac{22}{10}, \frac{10}{10})$ 55. No solution