6.1 EXERCISES

PRACTICE

Use the method of substitution to solve the following systems of equations. If a system is dependent, express the solution set in terms of one of the variables. See Examples 1 and 2.

1. $\begin{cases} 2x - y = -12 \\ 3x + y = -13 \end{cases}$ **2.** $\begin{cases} 2x - 4y = -6 \\ 3x - y = -4 \end{cases}$ **3.** $\begin{cases} 3y = 9 \\ x + 2y = 11 \end{cases}$

4. $\begin{cases} -3x - y = 2 \\ 9x + 3y = -6 \end{cases}$ **5.** $\begin{cases} 2x + y = -2 \\ -4x - 2y = 5 \end{cases}$ **6.** $\begin{cases} 5x - y = -21 \\ 9x + 2y = -34 \end{cases}$

7. $\begin{cases} 2x - y = -3 \\ -4x + 2y = 6 \end{cases}$ **8.** $\begin{cases} 3x + 6y = -12 \\ 2x + 4y = -8 \end{cases}$ **9.** $\begin{cases} 2x + 5y = 33 \\ 3x = -3 \end{cases}$

10. $\begin{cases} 5x + 2y = 8 \\ 2x + y = 6 \end{cases}$ **11.** $\begin{cases} -2x + y = 5 \\ 9x - 2y = 5 \end{cases}$ **12.** $\begin{cases} 3x + y = 4 \\ -2x + 3y = 1 \end{cases}$

13. $\begin{cases} 4x - y = -1 \\ -8x + 2y = 2 \end{cases}$ **14.** $\begin{cases} 4x - 2y = 3 \\ -2x + y = -7 \end{cases}$ **15.** $\begin{cases} 9x - y = -1 \\ 3x + 2y = 44 \end{cases}$

Use the method of elimination to solve the following systems of equations. If a system is dependent, express the solution set in terms of one of the variables. See Examples 3 and 4.

16. $\begin{cases} 2x - 3y = 8 \\ 8x + 5y = -2 \end{cases}$ **17.** $\begin{cases} -2x + 3y = 13 \\ 4x + 2y = -18 \end{cases}$ **18.** $\begin{cases} 5x + 7y = 1 \\ -2x + 3y = -12 \end{cases}$

19. $\begin{cases} x + 2y = 17 \\ 3x + 4y = 39 \end{cases}$ **20.** $\begin{cases} 5x - 10y = 9 \\ -x + 2y = -3 \end{cases}$ **21.** $\begin{cases} -2x - 2y = 4 \\ 3x + 3y = -6 \end{cases}$

22. $\begin{cases} 4x + y = 11 \\ 3x - 2y = 0 \end{cases}$ **23.** $\begin{cases} 7x + 8y = -3 \\ -5x - 4y = 9 \end{cases}$ **24.** $\begin{cases} -2x - y = 9 \\ 4x + 2y = 1 \end{cases}$

25. $\begin{cases} -2x + 4y = 6 \\ 3x - y = -4 \end{cases}$ **26.** $\begin{cases} 5x - 6y = -1 \\ -4x + 3y = -10 \end{cases}$ **27.** $\begin{cases} \frac{2}{3}x + y = -3 \\ 3x + \frac{5}{2}y = -\frac{7}{2} \end{cases}$

28. $\begin{cases} \frac{x}{5} - y = -\frac{11}{5} \\ \frac{x}{4} + y = 4 \end{cases}$ **29.** $\begin{cases} \frac{2}{3}x + 2y = 1 \\ x + 3y = 0 \end{cases}$ **30.** $\begin{cases} -x - 5y = -6 \\ \frac{3}{5}x + 3y = 1 \end{cases}$

Use any convenient method to solve the following systems of equations. If a system is dependent, express the solution set in terms of one or more of the variables, as appropriate. See Examples 5 and 6.

31. $\begin{cases} x-y+4z=-4 \\ 4x+y-2z=-1 \\ -y+2z=-3 \end{cases}$

32. $\begin{cases} x+2y=-1 \\ y+3z=7 \\ 2x+5z=21 \end{cases}$

33. $\begin{cases} x+y=4 \\ y+3z=-1 \\ 2x-2y+5z=-5 \end{cases}$

34. $\begin{cases} 2x-y=0 \\ 5x-3y-3z=5 \\ 2x+6z=-10 \end{cases}$

35. $\begin{cases} 3x-y+z=2 \\ -6x+2y-2z=-4 \\ -3x+y-z=-2 \end{cases}$

36. $\begin{cases} 2x-3y=-2 \\ x-4y+3z=0 \\ -2x+7y-5z=0 \end{cases}$

37. $\begin{cases} 3x-y+z=2 \\ -6x+2y-2z=1 \\ 5x+2y-3z=2 \end{cases}$

38. $\begin{cases} 4x-y+5z=6 \\ 4x-3y-5z=-14 \\ -2x-5z=-8 \end{cases}$

39. $\begin{cases} 3x+8z=3 \\ -3x+y-7z=-2 \\ x+2y+3z=3 \end{cases}$

40. $\begin{cases} x+2y+z=8 \\ 2x-3y-4z=-16 \\ x-5y+5z=6 \end{cases}$

41. $\begin{cases} 2x-7y-4z=7 \\ -x+4y+2z=-3 \\ 3y-4z=-1 \end{cases}$

42. $\begin{cases} 4x+4y-2z=6 \\ x-5y+3z=-2 \\ -2x-2y+z=3 \end{cases}$

43. $\begin{cases} 2x+3y+4z=1 \\ 3x-4y+5z=-5 \\ 4x+5y+6z=5 \end{cases}$

44. $\begin{cases} x-4y+2z=-1 \\ 2x+y-3z=10 \\ -3x+12y-6z=3 \end{cases}$

45. $\begin{cases} x+2y+3z=29 \\ 2x-y-z=-2 \\ 3x+2y-6z=-8 \end{cases}$

46. $\begin{cases} 5x-2y+z=14 \\ 8x+4y=12 \\ 9x=18 \end{cases}$

47. $\begin{cases} 2x+5y=6 \\ 3y+8z=-6 \\ x+4y=-5 \end{cases}$

48. $\begin{cases} 4x+3y+4z=5 \\ 5x-6y-2z=-12 \\ 5z=20 \end{cases}$

49. $\begin{cases} 9x+4y-8z=-4 \\ -6x+3y-9z=-9 \\ 8y-3z=18 \end{cases}$

50. $\begin{cases} 21x-7y+51z=141 \\ 13x+9y-5z=-19 \\ 19x-8y+23z=30 \end{cases}$

APPLICATIONS

51. Karen empties out her purse and finds 45 loose coins, consisting entirely of nickels and pennies. If the total value of the coins is \$1.37, how many nickels and how many pennies does she have?

52. What choice of a, b, and c will force the graph of the polynomial $f(x) = ax^2 + bx + c$ to have a y-intercept of 5 and to pass through the points $(1,3)$ and $(2,0)$?

53. A tour organizer is planning on taking a group of 40 people to a musical. Balcony tickets cost \$29.95 and regular tickets cost \$19.95. The organizer collects a total of \$1048.00 from her group to buy the tickets. How many people chose to sit in the balcony?

54. How many ounces each of a 12% alcohol solution and a 30% alcohol solution must be combined to obtain 60 ounces of an 18% solution?

55. Eliza's mother is 20 years older than Eliza, but 3 years younger than Eliza's father. Eliza's father is 7 years younger than three times Eliza's age. How old is Eliza?

56. An investor decides at the beginning of the year to invest some of his cash in an account paying 8% annual interest, and to put the rest in a stock fund that ends up earning 15% over the course of the year. He puts \$2000 more in the first account than in the stock fund, and at the end of the year he finds he has earned \$1310 in interest. How much money was invested at each of the two rates?

57. Jack and Tyler went shopping for summer clothes. Shirts were \$12.47 each, including tax, and shorts were \$17.23 per pair, including tax. Jack and Tyler spent a total of \$156.21 on 11 items. How many shirts and pairs of shorts did they buy?

58. Three years ago, Bob was twice as old as Marla. Fifteen years ago, Bob was three times as old as Marla. How old is Bob?

59. Deyanira empties her pockets and finds 42 coins consisting of quarters, dimes, and pennies. There are twice as many pennies as dimes and quarters total. If the total value of the coins is \$2.13, how many coins of each denomination does she have?

60. If an investor has invested \$1000 in stocks and bonds, how much has he invested in stocks if he invested four times more in stocks than in bonds?

61. Twelve years ago, Jim was twice as old as Kristin. Sixteen years ago, Jim was three times older than Kristin. How old is Jim?

62. A movie brought in \$740 in ticket sales in one day. Tickets during the day cost \$5 and tickets at night cost \$7. If 120 tickets were sold, how many were sold during the day?

63. A computer has 24 screws in its case. If there are 7 times more slotted screws than thumb screws, how many thumb screws are in the computer?

64. Jael has \$10,000 she would like to invest. She has narrowed her options down to a certificate of deposit paying 5% annually, bonds paying 4% annually, and stocks with an expected annual rate of return of 13.5%. If she wants to invest twice as much in the stocks as in the certificate of deposit and she wants to earn \$1000 in interest by the end of the year, how much should she invest in each type of investment?

65. Lea ordered fruit baskets for three of her coworkers. One contained 5 apples, 2 oranges, and 1 mango and cost \$6.81. Another contained 2 mangos, 8 oranges, and 3 apples and cost \$11.88. The third contained 4 apples, 4 oranges, and 4 mangos and cost \$11.04. How much did each type of fruit cost?

TECHNOLOGY

Solve each of the following systems of equations using a graphing utility.

66. $\begin{cases} 98x+43y-82z=-784 \\ -65x+34y=3032 \\ 28y-13z=966 \end{cases}$

67. $\begin{cases} 7.5x+5.2y-9.3z=-23.971 \\ -6.8x+4.4y=2.708 \\ 0.9x-1.88y=-2.0194 \end{cases}$

68. $\begin{cases} -5x+2y-20z=14 \\ 2x-3y+10z=-19 \\ 7x+4y-7z=-7 \end{cases}$

69. $\begin{cases} -5.5x+2.2y-5.1z=11.29 \\ 1.8x+4.9y-0.5z=7.066 \\ 3.9x-2.6y+6.3z=-3.698 \end{cases}$

70. $\begin{cases} 5x-10y+11z=19 \\ 27x+9y+7z=-44 \\ 2x+19y-4z=-3 \end{cases}$

71. $\begin{cases} -23x+17y-7z=-51 \\ -13x+25y-11z=45 \\ 51x-21y-28z=-58 \end{cases}$