solution of the given system is
\[ x = 4 - 2r - s, \quad y = r, \quad z = s \]
where \( r \) and \( s \) can be any real numbers. Each assignment of values to \( r \) and \( s \) results in a solution of the given system, so there are infinitely many solutions. For example, letting \( r = 1 \) and \( s = 2 \) gives the particular solution \( x = 0, y = 1, \) and \( z = 2 \). As in the last example, there is nothing special about the names of the parameters. In particular, since \( y = r \) and \( z = s \), we could consider \( y \) and \( z \) to be the two parameters.

Now Work Problem 23

PROBLEMS 3.4

In Problems 1–24, solve the systems algebraically.

1. \[ \begin{align*}
   x + 4y &= 3 \\
   3x - 2y &= -5
   \end{align*} \]
2. \[ \begin{align*}
   4x + 2y &= 9 \\
   5y - 4x &= 5
   \end{align*} \]
3. \[ \begin{align*}
   2x + 3y &= 1 \\
   x + 2y &= 0
   \end{align*} \]
4. \[ \begin{align*}
   2x - y &= 7 \\
   -x + 2y &= 0
   \end{align*} \]
5. \[ \begin{align*}
   3x + 5y &= 7 \\
   x - y &= 5
   \end{align*} \]
6. \[ \begin{align*}
   2p + q &= 16 \\
   3p + 3q &= 33
   \end{align*} \]
7. \[ \begin{align*}
   x - 2y &= 7 \\
   5x + 3y &= -9
   \end{align*} \]
8. \[ \begin{align*}
   4x + 12y &= 12 \\
   2x + 4y &= 12
   \end{align*} \]
9. \[ \begin{align*}
   4x - 3y - 2 &= 3x - y \\
   x + 5y &= -2 - y + 4
   \end{align*} \]
10. \[ \begin{align*}
   5x + 7y + 2 &= 9y - 4x + 6 \\
   \frac{2}{3}x - \frac{1}{2}y - \frac{1}{4} &= \frac{3}{2}x + \frac{3}{2}y + \frac{3}{4}
   \end{align*} \]
11. \[ \begin{align*}
   5x + 4y &= 2 \\
   2x + 3y &= -14
   \end{align*} \]
12. \[ \begin{align*}
   4x - \frac{1}{4}w &= \frac{1}{4} \\
   \frac{1}{4}x + \frac{3}{4}w &= \frac{1}{4}
   \end{align*} \]
13. \[ \begin{align*}
   2p + 3q &= 5 \\
   10p + 15q &= 25
   \end{align*} \]
14. \[ \begin{align*}
   5x - 3y &= 2 \\
   -10x + 6y &= 4
   \end{align*} \]
15. \[ \begin{align*}
   2x + y + 6z &= 3 \\
   x + y + z &= 1
   \end{align*} \]
16. \[ \begin{align*}
   3x + 2y - 2z &= 2 \\
   4x + 2y + 2z &= 0
   \end{align*} \]
17. \[ \begin{align*}
   x + 4y + 3z &= 10 \\
   4x + 2y - z &= 2
   \end{align*} \]
18. \[ \begin{align*}
   3x + y + z &= 11 \\
   2x - 4y + 5z &= 26
   \end{align*} \]
19. \[ \begin{align*}
   x - 2y &= 1 \\
   y + z &= 3
   \end{align*} \]
20. \[ \begin{align*}
   2x + 3y &= 1 \\
   3x - 4z &= 0
   \end{align*} \]
21. \[ \begin{align*}
   x + y + 2z &= 0 \\
   2x - y - z &= 0
   \end{align*} \]
22. \[ \begin{align*}
   x + 2y - 3z &= 0 \\
   -x + 2y + z &= 0
   \end{align*} \]
23. \[ \begin{align*}
   x - 3y + 5z &= 15 \\
   -2x + 6y - 2z &= -10
   \end{align*} \]
24. \[ \begin{align*}
   5x + y + z &= 17 \\
   4x + y + z &= 14
   \end{align*} \]
25. Mixture A chemical manufacturer wishes to fill an order for 800 gallons of a 25% acid solution. Solutions of 20% and 35% are in stock. How many gallons of each solution must be mixed to fill the order?
26. Mixture A gardener has two fertilizers that contain different concentrations of nitrogen. One is 8% nitrogen and the other is 11% nitrogen. How many pounds of each should she mix to obtain 20 pounds of a 9% concentration?
27. Fabric A textile mill produces fabric made from different fibers. From cotton, polyester, and nylon, the owners want to produce a fabric blend that will cost $3.25 per pound to make. The cost per pound of these fibers is $4.00, $3.00, and $2.00, respectively. The amount of nylon is to be the same as the amount of polyester. How much of each fiber will be in the final fabric?
28. Taxes A company has taxable income of $758,000. The federal tax is 35% of that portion left after the state tax has been paid. The state tax is 15% of that portion left after the federal tax has been paid. Find the federal and state taxes.
29. Airplane Speed An airplane travels 900 mi in 2 h, 55 min, with the aid of a tailwind. It takes 3 h, 26 min, for the return trip, flying against the same wind. Find the speed of the airplane in still air and the speed of the wind.
30. Speed of Raft On a trip on a raft, it took 4 hour to travel 10 miles downstream. The return trip took 5 hour. Find the speed of the raft in still water and the speed of the current.
31. Furniture Sales A manufacturer of dining-room sets produces two styles: early American and contemporary. From past experience, management has determined that 20% of the early American styles can be sold than the contemporary styles. A profit of $250 is made on each early American set sold, whereas a profit of $350 is made on each contemporary set. If, in the forthcoming year, management desires a total profit of $130,000, how many units of each style must be sold?
32. Survey National Surveys was awarded a contract to perform a product-rating survey for Crisp Appeal Crackers. A total of