3 CHAPTER REVIEW

3.4 Solve Systems of Linear Equations in Three Variables *pp. 178–185*

EXAMPLE

Solve the system.

$$\begin{aligned} 2x + y + 3z &= 5 && \text{Equation 1} \\ -x + 3y + z &= -14 && \text{Equation 2} \\ 3x - y - 2z &= 11 && \text{Equation 3} \end{aligned}$$

Rewrite the system as a linear system in two variables. Add -3 times Equation 1 to Equation 2. Then add Equation 1 and Equation 3.

$$\begin{array}{rrr} -6x - 3y - 9z = -15 \\ -x + 3y + z = -14 \\ \hline -7x \quad - 8z = -29 \end{array} \qquad \begin{array}{rrr} 2x + y + 3z = 5 \\ 3x - y - 2z = 11 \\ \hline 5x \quad + z = 16 \end{array}$$

Solve the new linear system for both of its variables.

$$\begin{array}{rrr} -7x - 8z = -29 \\ 40x + 8z = 128 \\ \hline 33x \quad = 99 \end{array} \qquad \begin{array}{l} \text{Add new Equation 1 to} \\ \text{8 times new Equation 2.} \end{array}$$

$$\begin{aligned} x &= 3 && \text{Solve for } x. \\ z &= 1 && \text{Substitute into new Equation 1 or 2 to find } z. \end{aligned}$$

Substituting $x = 3$ and $z = 1$ into one of the original equations and solving for y gives $y = -4$. The solution is $(3, -4, 1)$.

EXERCISES

EXAMPLES 1 and 4 on pp. 179–181 for Exs. 14–17

Solve the system.

14. $x - y + z = 10$
$4x + y - 2z = 15$
$-3x + 5y - z = -18$

15. $6x - y + 4z = 6$
$-x - 3y + z = 31$
$2x + 2y - 5z = -42$

16. $5x + y - z = 40$
$x + 7y + 4z = 44$
$-x + 3y + z = 16$

17. MUSIC Fifteen band members from a school were selected to play in the state orchestra. Twice as many students who play a wind instrument were selected as students who play a string or percussion instrument combined. Of the students selected, one fifth play a string instrument. How many of the students selected play each type of instrument?

3.5 Perform Basic Matrix Operations *pp. 187–193*

EXAMPLE

Perform the indicated operation.

a. $\begin{bmatrix} 4 & -1 \\ 2 & 5 \end{bmatrix} + \begin{bmatrix} -5 & 2 \\ -3 & 1 \end{bmatrix} = \begin{bmatrix} 4 + (-5) & -1 + 2 \\ 2 + (-3) & 5 + 1 \end{bmatrix} = \begin{bmatrix} -1 & 1 \\ -1 & 6 \end{bmatrix}$

b. $4\begin{bmatrix} -2 & 0 \\ 3 & 5 \end{bmatrix} = \begin{bmatrix} 4(-2) & 4(0) \\ 4(3) & 4(5) \end{bmatrix} = \begin{bmatrix} -8 & 0 \\ 12 & 20 \end{bmatrix}$