

38-39

Solving 3 Variable Systems

3.5

P. 38

Warm up: Review

Solve the system

$$12x + y = 29$$

$$x = 2y - 8$$

$$x = 2(5) - 8$$

$$x = 10 - 8$$

$$x = 2$$

$$\text{Sol. } (2, 5) \text{ CR: } 12(2) + 5 \stackrel{?}{=} 29$$

$$24 + 5 = 29$$

$$29 = 29 \checkmark$$

$$12(2y - 8) + y = 29$$

$$\begin{array}{r} 24y - 96 + y = 29 \\ \hline \end{array}$$

$$25y = 125$$

$$y = 5$$

Learning Objectives

3.5 Systems with Three Variables

I can solve systems in three variables using substitution.

I can model real-world application systems with three variables.

Solving Systems of 3 Equations

P. 39

Solutions are written in the form (x, y, z) Solve the simplest equation first.Use answer to find remaining variables.

Example 1:

$$5x + 2y = 0$$

$$6y + 5z = 10$$

$$-3z = 12$$

③

$$5x + 2(5) = 0$$

$$5x + 10 = 0$$

$$\begin{array}{r} -10 \quad -10 \\ \hline \end{array}$$

$$5x = -10$$

$$x = -2$$

$$\textcircled{1} \frac{-3z = 12}{-3} = \frac{12}{-3}$$

$$z = -4$$

$$\textcircled{2} 6y + 5(-4) = 10$$

$$\begin{array}{r} 6y - 20 = 10 \\ +20 \quad +20 \\ \hline \end{array}$$

$$6y = 30$$

$$\frac{6}{6} = \frac{30}{6}$$

$$y = 5$$

$$\text{Sol. } (-2, 5, -4)$$

Example 2:

P. 39

Solve the system of equations

$$x + y + 3z = 7$$

$$2x - z = 6$$

$$-7z = -28$$

$$\textcircled{1} \frac{-7z = -28}{-7} = \frac{-28}{-7}$$

$$z = 4$$

$$\textcircled{2} \begin{array}{r} 2x - 4 = 6 \\ +4 \quad +4 \\ \hline \end{array}$$

$$2x = 10$$

$$\frac{2}{2} = \frac{10}{2}$$

$$x = 5$$

$$\textcircled{3} 5 + y + 3(4) = 7$$

$$5 + y + 12 = 7$$

$$y + 17 = 7$$

$$y = -10$$

$$\text{Sol. } (5, -10, 4)$$

Homework - 3.5 Solving Systems of
Equations in 3 variables.

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