

Notes 6.3 Solving Systems of Linear Equations  
In Several Variables

**Solve systems of equations using:**

- Back substitution.
- The elimination method.
- Find the number of Solutions.  
(Infinite, One or No Solution)

5-10 Use back-substitution to solve the triangular system.

$$8. \quad \begin{cases} x - 2y + 3z = 10 \\ 2y - z = 2 \\ 3z = 12 \end{cases}$$

11-14 Perform an operation on the given system that eliminates the indicated variable.  
Write the new equivalent system.

$$12. \quad \begin{cases} x + y - 3z = 3 \\ -2x + 3y + z = 2 \\ x - y + 2z = 12 \end{cases}$$

Eliminate the  $x$ -term from the second equation.

15-32 Find the complete solution of the linear system,  
Or show that it is inconsistent.

$$18. \quad \begin{cases} x - y + 2z = 2 \\ 3x + y + 5z = 8 \\ 2x - y - 2z = -7 \end{cases}$$

$$24. \begin{cases} -x + 2y + 5z = 4 \\ x - 2z = 0 \\ 4x - 2y - 11z = 2 \end{cases}$$

$$28. \begin{cases} x - 2y + z = 3 \\ 2x - 5y + 6z = 7 \\ 2x - 3y - 2z = 5 \end{cases}$$

Quiz 1 Chapter 6

*Solve the system of Linear Equations:*

$$\begin{cases} x - y + 3z = 4 \\ x + 2y - 2z = 10 \\ 3x - y + 5z = 14 \end{cases}$$

Notes 6.3 Solving Systems of Linear Equations  
In Several Variables

**Solve systems of equations using:**

- Back substitution.
- The elimination method.
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(Infinite, One or No Solution)

5-10 Use back-substitution to solve the triangular system.

8. 
$$\begin{cases} x - 2y + 3z = 10 \\ 2y - z = 2 \\ 3z = 12 \end{cases} \rightarrow \begin{array}{l} 2y - 4 = 2 \\ 2y = 6 \\ y = 3 \end{array} \rightarrow \begin{array}{l} x - 2(3) + 3(4) = 10 \\ x + 6 = 10 \\ x = 4 \end{array}$$

$3z = 12$   
 $z = 4$

Check  $x - 2y + 3z = 10$   
 $4 - 2(3) + 3(4) = 10 \checkmark$

11-14 Perform an operation on the given system that eliminates the indicated variable.  
Write the new equivalent system.

12. 
$$\begin{cases} 2(x + y - 3z = 3) \\ -2x + 3y + z = 2 \\ x - y + 2z = 12 \end{cases} \rightarrow \begin{array}{l} 2x + 2y - 6z = 6 \\ -2x + 3y + z = 2 \\ \hline 5y - 5z = 8 \end{array}$$

Eliminate the x-term from the second equation.

$$\begin{cases} x + y - 3z = 3 \\ 5y - 5z = 8 \\ x - y + 2z = 12 \end{cases}$$

15-32 Find the complete solution of the linear system,  
Or show that it is inconsistent.

18. 
$$\begin{cases} x - y + 2z = 2 \\ 3x + y + 5z = 8 \\ 2x - y - 2z = -7 \end{cases} \rightarrow \begin{array}{l} + (4x + 7z = 10) - 5 \rightarrow -20x - 35z = -50 \\ + (5x + 3z = 1) 4 \rightarrow 20x + 12z = 4 \\ \hline -23z = -46 \end{array}$$

$$\begin{array}{l} 4x + 7z = 10 \\ 4x + 7(2) = 10 \\ 4x = -4 \\ \boxed{x = -1} \end{array}$$

$$\begin{array}{l} x - y + 2z = 2 \\ -1 - y + 2(2) = 2 \\ -y = -1 \\ \boxed{y = 1} \end{array}$$

Check:

$$\begin{array}{l} 3x + y + 5z = 8 \\ 3(-1) + 1 + 5(2) = 8 \\ 8 = 8 \checkmark \end{array}$$

$$\boxed{(-1, 1, 2)}$$

$$24. \begin{cases} -x + 2y + 5z = 4 \\ x - 2z = 0 \\ 4x - 2y - 11z = 2 \end{cases} + 3x - 6z = 6 \rightarrow x - 2z = 2$$

$$x - 2z = 0$$

$$-1(x - 2z = 2)$$

$$x - 2z = 0$$

$$-x + 2z = -2$$

$$0 = -2$$

No solution

$$28. \begin{cases} x - 2y + z = 3 \\ 2x - 5y + 6z = 7 \\ 2x - 3y - 2z = 5 \end{cases} \rightarrow \begin{cases} -2x + 4y - 2z = -6 \\ 2x - 5y + 6z = 7 \end{cases}$$

$$-y + 4z = 1$$

$$y - 4z = -1$$

$$y = 4z - 1$$

$$-2x + 4y - 2z = -6$$

$$2x - 3y - 2z = 5$$

$$y - 4z = -1$$

$$-y + 4z = 1$$

$$y - 4z = -1$$

$$0 = 0$$

infinite solutions

$$x - 2(4z - 1) + z = 3$$

$$x - 8z + 2 + z = 3$$

$$x - 7z = 1$$

$$x = 7z + 1$$

$$(7z + 1, 4z - 1, z)$$

### Quiz 1 Chapter 6

Solve the system of Linear Equations:

$$2 \begin{cases} x - y + 3z = 4 \\ x + 2y - 2z = 10 \\ 3x - y + 5z = 14 \end{cases}$$

$$2x - 2y + 6z = 8$$

$$6x - 2y + 10z = 28$$

$$(2, 7, 3)$$

$$2 - y + 9 = 4$$

$$-y = -7 \quad (3x + 4z = 18) - 2$$

$$y = 7$$

$$7x + 8z = 38$$

$$6 + 4z = 18$$

$$4z = 12$$

$$-6x - 8z = -36$$

$$7x + 8z = 38$$

$$x = 2$$

$$z = 3$$