Course Number

Instructor

Date

Section 9.3 Multivariable Linear Systems

Objective: In this lesson you learned how to recognize linear systems in row-echelon form and to use back-substitution to solve the systems, how to solve systems of equations by Gaussian elimination, how to solve nonsquare systems of equations, and how to use systems of linear equations in three or more variables to model and solve real-life problems.

Important Vocabulary Define each term or concept.

Row-echelon form

Ordered triple

Row operations

Gaussian elimination

Nonsquare system of equations

I. Row-Echelon Form and Back-Substitution (Page 665)

What you should learn
How to recognize linear systems in row-echelon form and use back-substitution to solve the systems

When elimination is used to solve a system of linear equations, the goal is . . .

Example 1: Solve the system of linear equations.

$$\begin{cases} x + y - z = 9 \\ y - 2z = 4 \\ z = 1 \end{cases}$$

II. Gaussian Elimination (Pages 666–669)

What you should learn
How to use Gaussian elimination to solve systems of linear equations

To solve a system that is not in row-echelon form, . . .

List the three row operations on a system of linear equations that produces an equivalent system of linear equations.

1.

2.

3.

The solution(s) of a system of linear equations in more than two variables must fall into one of the following three categories:

1.

2.

3.

Example 2: Solve the system of linear equations.

$$\begin{cases} x + y + z = 3 \\ 2x - y + 3z = 16 \\ x - 2y - z = 1 \end{cases}$$

Example 3: The following equivalent system is obtained during the course of Gaussian elimination. Write the solution of the system.

$$\begin{cases} x + 2y - z = 4 \\ y + 2z = 8 \\ 0 = 0 \end{cases}$$

III. Nonsquare Systems (Page 670)

What you should learn
How to solve nonsquare systems of linear equations

In a square system of linear equations, the number of equations in the system is _____ the number of variables.

If a system has more variables than equations, the system cannot have a(n) _____.

Example 4: Solve the system of linear equations.

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

IV. Applications of Multivariable Systems (Pages 671–672)

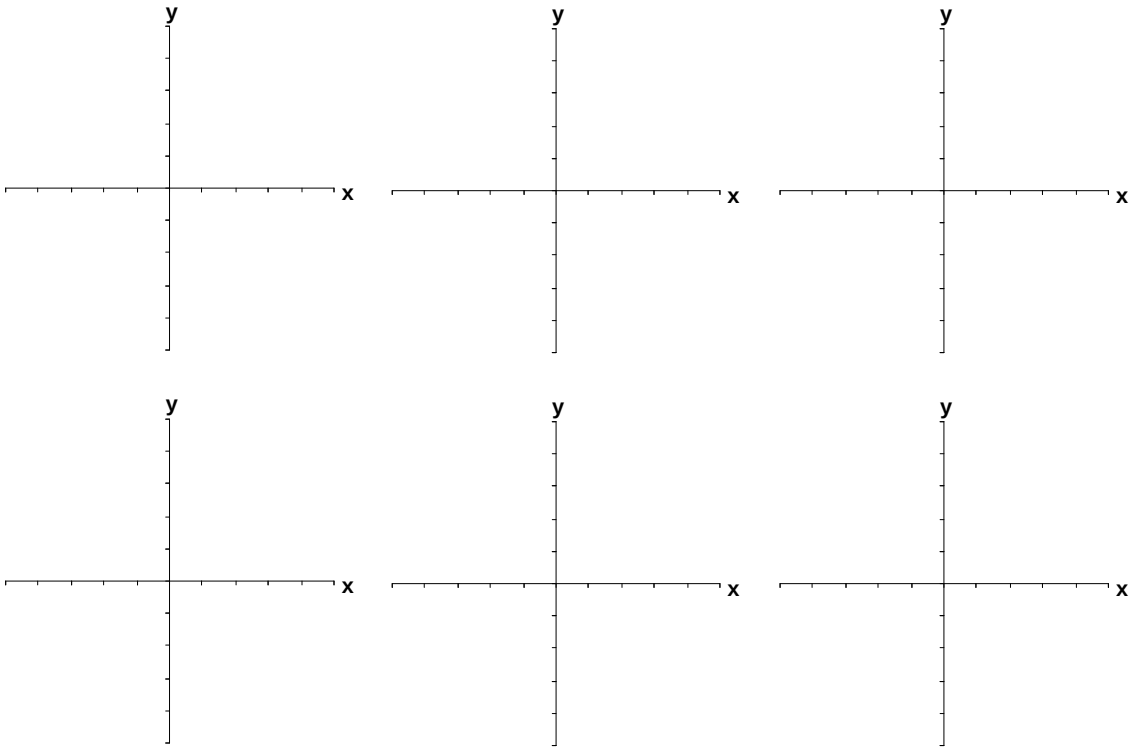
What you should learn
How to use systems of linear equations in three or more variables to model and solve application problems

The height at time t of an object that is moving in a vertical line with constant acceleration a is given by the position equation _____ , where s is measured in feet, t is measured in seconds, v_0 is the initial velocity, and s_0 is the initial height.

Describe a situation or application in which solving a system of multivariable linear systems is required.

Example 5: Find a quadratic equation, $y = ax^2 + bx + c$, whose graph passes through the points $(-4, 36)$, $(0, 8)$, and $(2, 0)$.

Additional notes



Homework Assignment

Page(s)

Exercises