Section 3.1/3.2

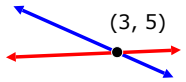
Systems of Linear Equations in Two Variables

Essential Question: How do you solve Linear Systems?

Objectives

1. Solve a System of Two Linear Equations by Graphing
2. Solve a System of Two Linear Equations by Substitution or Elimination
3. Identify Inconsistent Systems
4. Write the Solution of a System with Dependent Equations

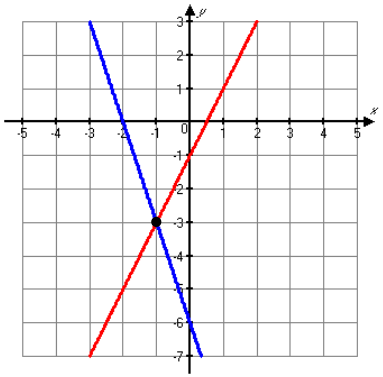
Classifying Systems Graphically

Graph	Number of Solutions	Type of System
 lines intersect at one point.	If the lines intersect, the system of equations has one solution given by the point of intersection.	Consistent The equations are independent.
 Parallel lines	If the lines are parallel, then the system of equations has no solution because the lines never intersect.	Inconsistent
 Lines coincide	If the lines lie on top of each other, then the system has infinitely many solutions. The solution set is the set of all points on the line.	Consistent The equations are dependent.

Solving a System by Graphing

Solve the system of equations by graphing.

1. $\begin{cases} 3x + y = -6 \\ -8x + 4y = -4 \end{cases}$



The Substitution Method

Solve the system of equations using substitution.

2. $\begin{cases} 3x + 2y = 0 \\ 6x + 2y = 5 \end{cases}$

3. $\begin{cases} x + y = 5000 \\ 0.04x + 0.08y = 340 \end{cases}$

The Elimination Method

Solve the system of equations using elimination.

4. $\begin{cases} x+2y=-8/3 \\ 3x-3y=5 \end{cases}$

5. $\begin{cases} \frac{3}{2}x-\frac{y}{8}=-1 \\ 16x+3y=-28 \end{cases}$

Inconsistent & Dependent Systems

Solve the system.

6. $\begin{cases} 5x-y=3 \\ -10x+2y=2 \end{cases}$

7. $\begin{cases} 6x-4y=8 \\ -9x+6y=-12 \end{cases}$

Section 3.5

Graphs in Three Dimensions

Essential Question: How do you graph equations in 3D?

Objectives

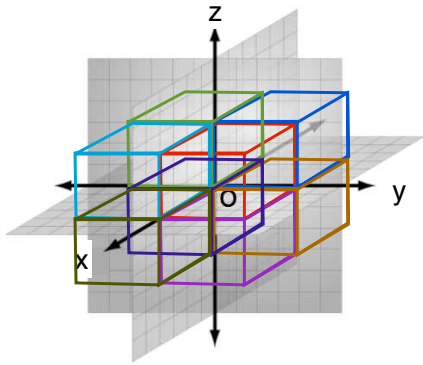
1 Graph points in three dimensions

2 Graph equations in three dimensions

Three-Dimensional Coordinate System

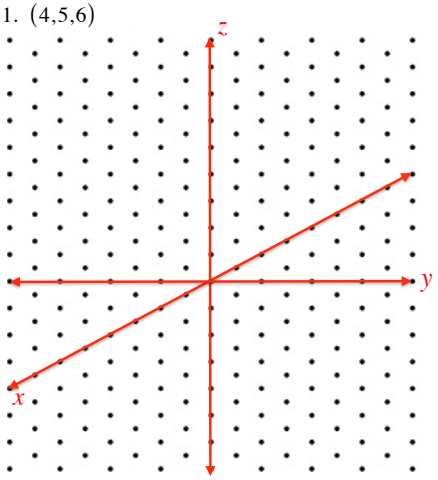
The 3-D coordinate system contains eight octants:

Octant I	Octant II	Octant V	Octant VI
$x \to +$	$x \to -$	$x \to +$	$x \to -$
$y \to +$	$y \to +$	$y \to +$	$y \to +$
$z \to +$	$z \to +$	$z \to -$	$z \to -$
Octant III	**Octant IV**	**Octant VII**	**Octant VIII**
$x \to -$	$x \to +$	$x \to -$	$x \to +$
$y \to -$	$y \to -$	$y \to -$	$y \to -$
$z \to +$	$z \to +$	$z \to -$	$z \to -$

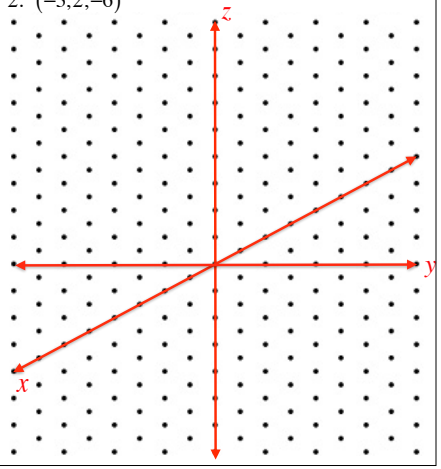


Graph each coordinate in space.

1. $(4,5,6)$

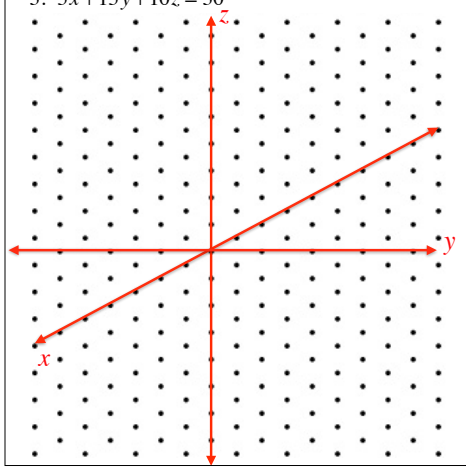


2. $(-3,2,-6)$

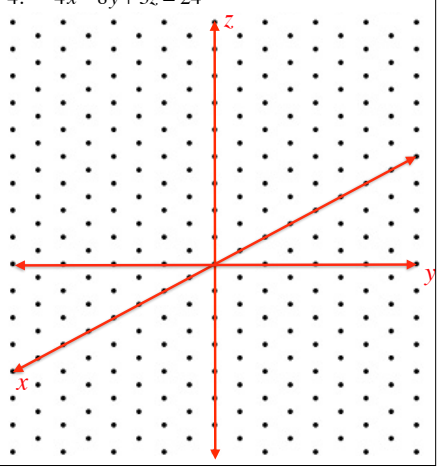


Sketch the graph of each equation.

3. $5x+15y+10z=30$



4. $-4x-8y+3z=24$



Section 3.6
Systems of Linear Equations in Three Variables

Objectives

1 Solve Systems of Three Linear Equations Containing Three Variables

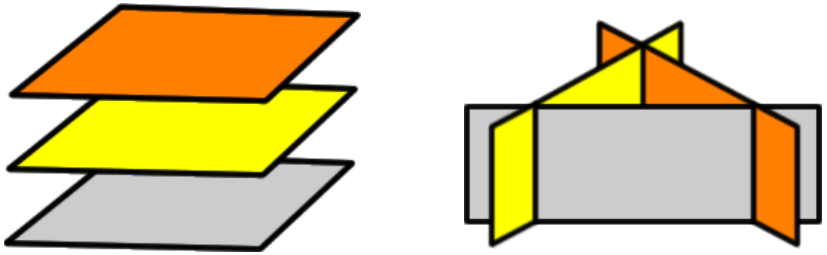
Possible Solutions

Systems of linear equations containing three variables have the same possible solutions as a system of two linear equations containing two variables:

1. Exactly one solution – A consistent system with independent equations
2. No solution – An inconsistent system
3. Infinitely many solutions – A consistent system with dependent equations

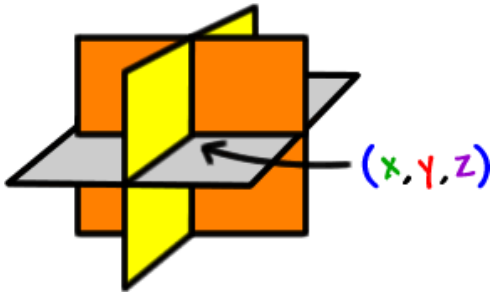
Recall that a solution to a system of equations consists of values for the variables that are solutions of each equation of the system.

Representation of No Solution Graphically

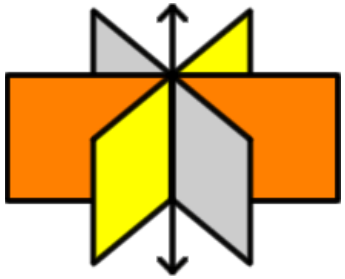


No point lies in all three planes.

Representation of One or Infinite Number of Solutions Graphically



The planes intersect at one common point.



The planes intersect at all the points along a common line.

Systems of Equations

1. Solve the system of equations.

$$\begin{cases} 2x-3y+z=10 & (1) \\ y+2z=13 & (2) \\ z=5 & (3) \end{cases}$$

Systems of Equations

2. Solve the system of equations.

$$\begin{cases} x-2y+3z=12 & (1) \\ 2x-y-2z=5 & (2) \\ 2x+2y-z=4 & (3) \end{cases}$$

Systems of Equations

3. Solve the system of equations.

$$\begin{cases} 2x - 4y - z = -18 & (1) \\ -6x - 3y + 2z = 2 & (2) \\ 4x + y - 6z = -37 & (3) \end{cases}$$

Systems of Equations

4. Solve the system of equations.

$$\begin{cases} 5r - 4s - 3t = 3 & (1) \\ t = s + r & (2) \\ r = 3s + 1 & (3) \end{cases}$$