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NOTES: Section 3.4 – Solve Systems of Linear Equations in Three Variables

Goals: #1 - I can solve a 3 variable system using elimination (with exactly one, zero, or infinitely many solutions).

#2 - I can solve a 3 variable system using substitution (with exactly one, zero, or infinitely many solutions).

Homework: Lesson 3.4 Worksheet

Warm Up: Graph the system of inequalities.

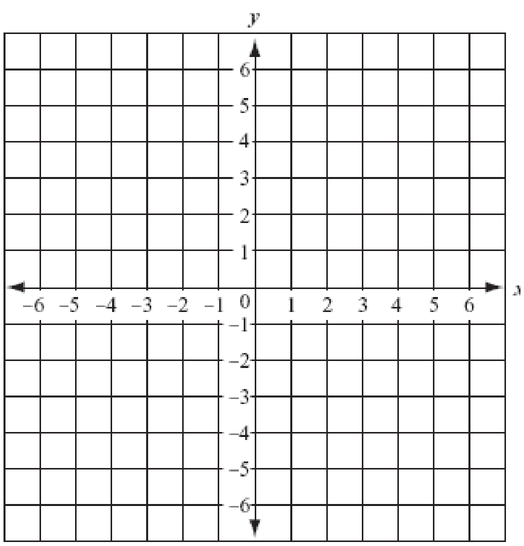
1. $2x - 4y \leq 8$

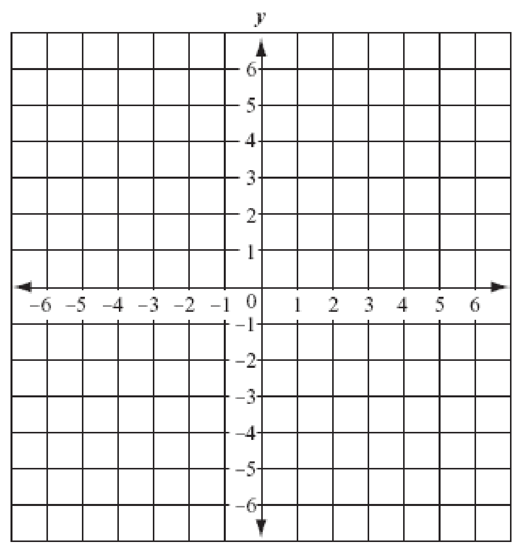
   $y < -\frac{1}{3}x + 4$

2. $y > |x + 2|$

   $y \leq 4$

   $x \leq -1$





Notes:

A ____, consists of three equations.

A ____________________ of this system, is an ____________________________

(x, y, z) where the planes in the system ____________________ at exactly one point.

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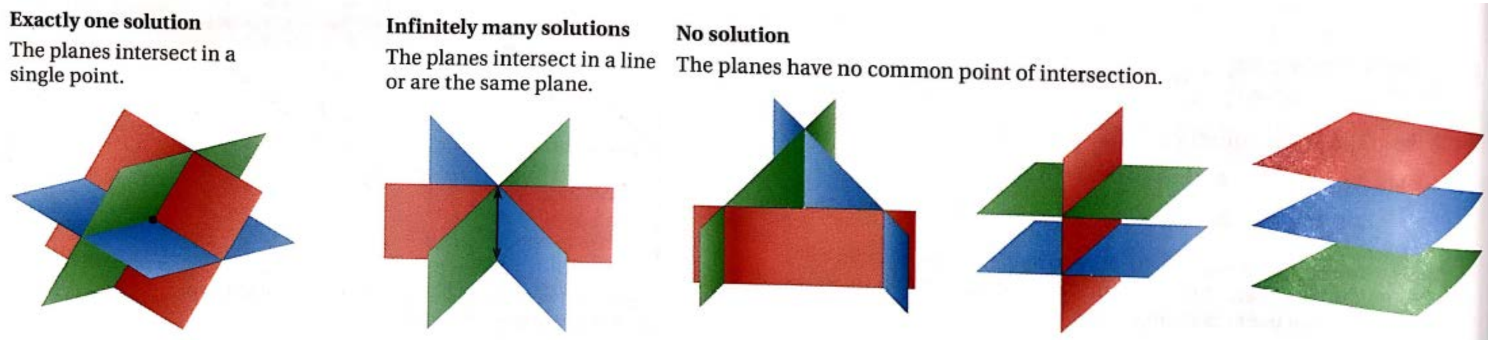

There are two algebraic methods for solving system of three equations:

____ and____

Example #1: Solve the system using <u>elimination.</u>

$4x + 2y + 3z = 1$

$2x - 3y + 5z = -14$

$6x - y + 4z = -1$

Step 1: Rewrite each system in *two* variables (eliminate a chosen variable).

Step 2: Solve for both variables.

Step 3: Substitute and solve for the remaining variable.

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Review:

We know that when we solve linear systems, we could have _______ solution, _____ solution, or __________________________ solutions. This is the same for ________________________________.

What does this look like algebraically?

ONE SOLUTION **NO SOLUTION** **INFINITELY MANY SOLUTIONS**

Example #2: Solve the system using <u>elimination.</u>

$$x + y + z = 3$$
$$4x + 4y + 4z = 7$$
$$3x - y + 2z = 5$$

Example #3: Solve the system using <u>elimination.</u>

$$x + y + z = 4$$
$$x + y - z = 4$$
$$3x + 3y + z = 12$$

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Example #4: Solve the system using substitution.

$$
\begin{aligned}
2x + y + z &= 8 \\
-x + 3y - 2z &= 3 \\
y &= x + z
\end{aligned}
$$

Example #5: At a carry-out pizza restaurant, an order of 3 slices of pizza, 4 breadsticks, and 2 sodas costs $13.35. A second order of 5 slices of pizza, 2 breadsticks, and 3 sodas costs $19.50. If 4 breadsticks and a soda cost $0.30 more than a slice of pizza, what is the cost of each item?