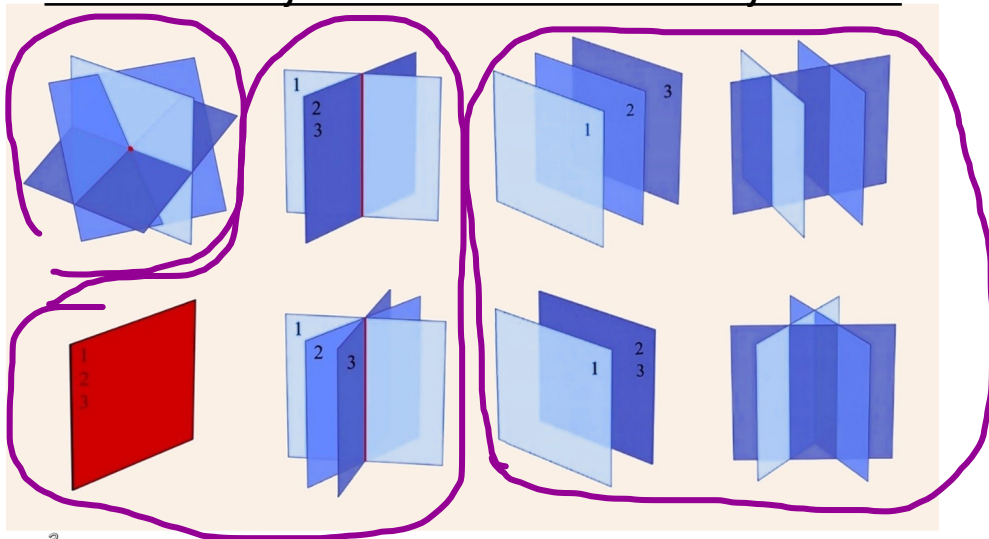


Find this Warm Up in your Class Notebook!

Warm Up: Circle together the groups of systems by type of solution (One, Infinitely Many, No Solution)

Which of these systems has a solution? How do you know?



Your Name

Mrs. Theo

10/27/2020

Notes

Lesson 1.4 -
Solving Systems of
3 Variable Equations

Elimination and
No Solution/Infinitely Many Solutions

Math Skill Objective:

- Visualize solutions of systems of equations in 3 variables
- Solve systems of equations with 3 variables algebraically using elimination
- Solve systems with no solution and infinitely many solutions.

Life

Lesson: Sometimes you and a friend might disagree and neither of you will be able to convince the other to change, often times the point that you disagree on does not have to ruin the friendship, agree to disagree and move on.

Solving 3
Variable
System by
Elimination

1. Eliminate one of the three variables and create two new equations with the same two variables

Make two pairs of equations that you will add together to eliminate the same variable from. You may need to multiply one or both equations by a number.

2. Solve the new system of two variables using elimination or substitution.

3. Plug the two solutions for the variables you found back in to one of the original 3 variable equations to solve for the third variable.

ex 1

$$\begin{cases} ① x + 2y + z = 10 \\ ② x + y - z = 13 \\ ③ 2x - 3y - z = 8 \end{cases}$$

Step 1

$$\begin{array}{r} ① x + 2y + z = 10 \\ + \\ ② x + y - z = 13 \\ \hline 2x + 3y = 23 \end{array}$$

$$\begin{array}{r} ① x + 2y + z = 10 \\ + \\ ③ 2x - 3y - z = 8 \\ \hline 3x - y = 18 \end{array}$$

Created a New 2 variable System to solve!

Step 2

Choose how you are going to solve

Solve for y

$$y = 3x - 18$$

Sub in

$$2x + 3y = 23$$

$$2x + 3(3x - 18) = 23$$

$$2x + 9x - 54 = 23$$

$$11x - 54 = 23$$

$$11x = 77$$

$$x = 7$$

Step 3

$$y = 3(7) - 18$$

$$y = 21 - 18$$

$$y = 3$$

(7, 3, -3)

$$\begin{cases} x + 2y + z = 10 \\ (7) + 2(3) + z = 10 \\ 13 + z = 10 \\ z = -3 \end{cases}$$

Ex 2: Solve the system.

$$\begin{cases} ① 6x + 8y - 6z = 62 \\ ② 10x - 12y - 14z = 14 \\ ③ 12x - 8y + 20z = -68 \end{cases}$$

BE CAREFUL THINK BEFORE YOU ACT

1 solution

Two is company
Three is a crowd
Pick a variable & KICK IT OUT!

$$\begin{array}{r} ① 6x + 8y - 6z = 62 \\ + \\ ③ 12x - 8y + 20z = -68 \\ \hline 18x + 14z = -6 \end{array}$$

$$\begin{array}{r} ① 18x + 24y - 18z = 186 \\ + \\ ② 20x - 24y - 28z = 28 \\ \hline 38x - 46z = 214 \end{array}$$

Solved for x to use substitution

$$\frac{18x}{18} = \frac{-14z - 6}{18}$$

$$x = -\frac{7}{9}z - \frac{1}{3}$$

$$38\left(-\frac{7}{9}z - \frac{1}{3}\right) - 46z = 214$$

$$-29.5z - 12.6 - 46z = 214$$

$$-16.4z = 226.6$$

$$z = -13.78$$

$$6x + 8y - 6z = 62$$

$$6(-11.05) + 8y - 6(-13.78) = 62$$

$$-66.32 + 8y + 82.70 = 62$$

$$16.38 + 8y = 62$$

$$8y = 45.62$$

$$y = -5.70$$

(-11.05, -5.70, -13.78)

Use any algebraic method to solve the system.

STOP!
THINK BEFORE
YOU ACT!

3. $x + y - z = 6$
 $2y - 3z = 4$
 $-y + 2z = -1$



4. $x + 2y - z = 3$
 $x - 3y + z = -1$
 $-x + y - 3z = 5$

3. Solve this system for two variables for y and z, then plug in to the 1st equation to solve for x!

$$\begin{array}{r} \textcircled{1} \ x + 2y - z = 3 \\ + \textcircled{3} \ -x + y - 3z = 5 \\ \hline 3y - 4z = 8 \end{array} \qquad \begin{array}{r} \textcircled{2} \ x - 3y + z = -1 \\ + \textcircled{3} \ -x + y - 3z = 5 \\ \hline -2y - 2z = 4 \end{array}$$

$$\begin{array}{r} 4y + 4z = -8 \\ + 3y - 4z = 8 \\ \hline 7y = 0 \\ y = 0 \end{array} \qquad \begin{array}{r} -2y - 2z = 4 \\ -2(0) - 2z = 4 \\ 0 - 2z = 4 \\ \frac{-2z}{-2} = \frac{4}{-2} \\ z = -2 \end{array}$$

$(1, 0, -2)$

$$\begin{array}{l} x + 2y - z = 3 \\ x + 2(0) - (-2) = 3 \\ x + 2 = 3 \\ x = 1 \end{array}$$