

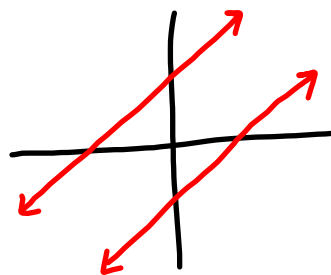
Algebra 1 : 5.4 Special Systems

Sometimes a system of linear equations can have no solutions, or more than one solution. How could this happen?

No solutions example: There are no intersections.

This means the lines are parallel.

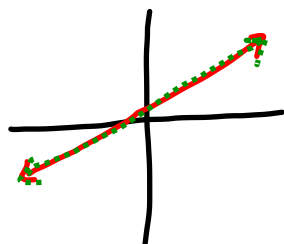
They have the Same Slope.



"Infinitely Many" solutions example:

This happens when you have 2 of the same line.

They are basically "on top" of each other.



5.4 - Solving Special Systems

No Solutions:

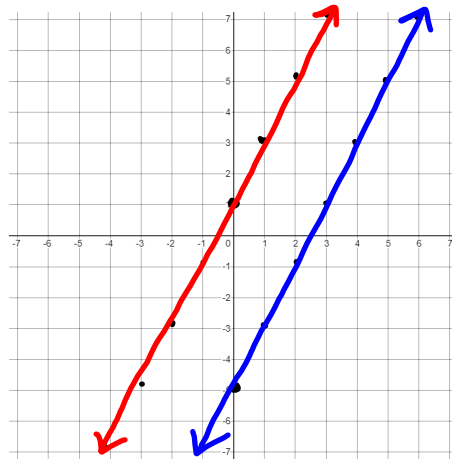
Sometimes it's pretty easy to determine there will be no solutions. Why would this system have no solutions?

$$\begin{aligned} \text{blue } y &= 2x - 5 \\ \text{red } y &= 2x + 1 \end{aligned}$$

$$y = mx + b$$

↑
slope

both lines have the
same slope



The lines never
intersect.

Answer : No Solutions

Other times it's harder. This is how you determine if there are no solutions when the problem is more complicated.

$$\begin{aligned} 6x - 2y &= 16 \\ 2 \cdot (-3x + 1y &= 2) \end{aligned}$$

$$\begin{aligned} 6x - 2y &= 16 \\ -6x + 2y &= 4 \end{aligned}$$

$$0 = 20$$

Use Elimination.

We will eliminate x's.
(you could choose to do y's
if you wanted to)

Notice both variables cancelled

Look at the end statement.

this is a false statement,
there are No Solutions.

5.4 - Solving Special Systems

Infinitely Many Solutions:

This happens when your equations are actually the same line. Here's an example.

$$\begin{array}{r} 2x - 6y = 10 \\ -2 \cdot (1x - 3y = 5) \\ \hline \cancel{2x} - \cancel{6y} = 10 \\ -\cancel{2x} + \cancel{6y} = -10 \\ \hline 0 = 0 \end{array}$$

Use Elimination: Eliminate x .

Notice how Everything cancelled this time.

← This is a true statement.

So there are infinitely many solutions

When it's not so obvious that they are the same line, you can still use elimination. Here's how that works.

$$\begin{array}{r} y = 7x + 13 \\ -7x \quad -7x \\ -21x + 3y = 39 \\ (-7x + 14 = 13) \cdot -3 \\ \hline -\cancel{21x} + \cancel{3y} = 39 \\ \cancel{21x} + \cancel{3y} = -39 \\ \hline 0 = 0 \end{array}$$

Get in same format.

Use Elimination!
Eliminate y 's.

← Everything cancelled

Infinitely Many Solutions

5.4 - Solving Special Systems

Homework:

Page 249

3-12. On 3-8, you don't have to match the problems to the graphs.