

Precalculus

8-01 Nonlinear and Linear Systems

System of Equations

- Several equations with the _____ solution

Substitution

1. _____ one equation for a variable
2. _____ this expression into the other equation
3. _____ the new equation
4. _____ the solution back into the 1st equation and solve
5. _____ your answers!

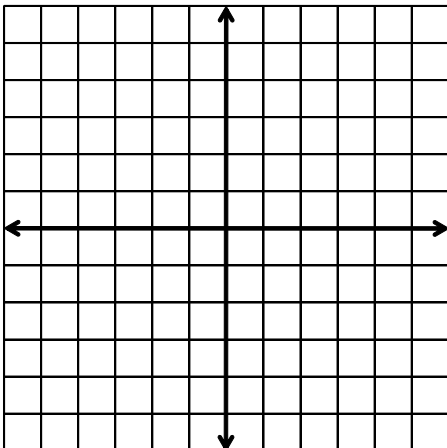
Solve $\begin{cases} -2x + y = 5 \\ x^2 + 3x - y = 1 \end{cases}$

Graphical Method

- _____ both equations on _____ coordinate plane
- The points of _____ are the solutions.

Solve graphically

$$\begin{cases} x^2 - y = 5 \\ -x + y = -3 \end{cases}$$

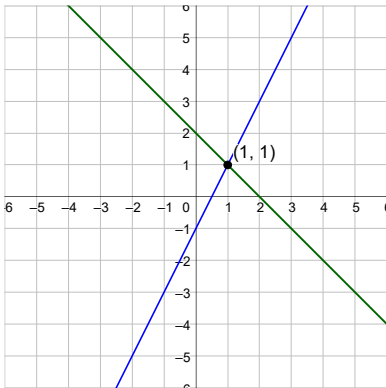


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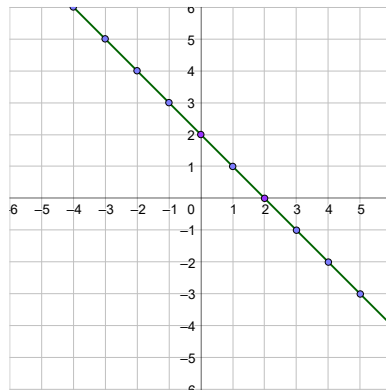
8-02 Two-Variable Linear Systems

Three possibilities for solutions

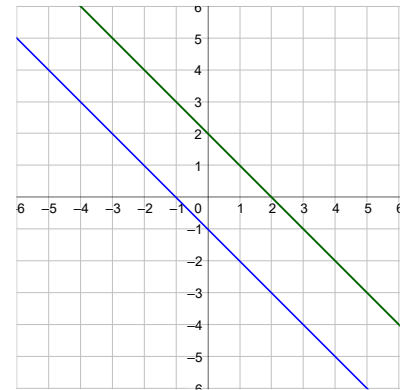
- 1 Solution: _____
and _____



- Infinitely Many Solutions: _____
and _____



- No Solution: _____



Solving Linear Equations by Elimination

1. Write the equations in _____ ($ax + by = c$)
2. Obtain coefficients of one variable that differ only in _____ by _____ the equations by constants.
3. _____ the equations and _____ the resulting equation. (A variable will be eliminated.)
4. _____ the answer into either original equation and solve.
5. _____ your solution.

- If _____ the variables are _____ and the result is
 - True (like $0 = 0$), there are _____
 - False (like $0 = 9$), there are _____

Solve $\begin{cases} 4x + y = -3 \\ x - 3y = 9 \end{cases}$

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8-03 Multivariable Linear Systems

Row-Echelon Form

- The first _____ term in each equation has a coefficient of _____.
- All terms _____ the leading 1 are _____ producing an inverted _____ shape.
- Any equations that are all _____ are at the _____.

$$\begin{cases} 1x + y + 3z = 3 \\ 1y + 5z = 10 \\ 1z = 7 \end{cases}$$

Elementary Row Operations

The following operations are allowed in systems of equations and produce equivalent systems.

- _____ two equations
- _____ one equation by a nonzero constant
- _____ a multiple of one equation to another equation and replace the latter equation

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

$$\text{Solve } \begin{cases} x + 2y - 7z = -4 \\ 2x + 3y + z = 5 \\ 3x + 7y - 36z = -25 \end{cases}$$

$$\text{Solve } \begin{cases} x - y + 4z = 3 \\ 4x - z = 0 \end{cases}$$

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8-04 Partial Fractions

- To split a rational function into smaller _____

$$\frac{x+8}{x^2+6x+8} = \frac{?}{x+2} + \frac{?}{x+4}$$

To Find Partial Fractions

- _____ the denominator.
- For each _____ factor of the denominator are in the form

$$\frac{A}{px+q} + \frac{B}{(px+q)^2} + \dots$$

- For each _____ factor of the denominator are in the form

$$\frac{Ax+B}{ax^2+bx+c} + \frac{Cx+D}{(ax^2+bx+c)^2} + \dots$$

- _____ for A, B, C , etc.
- Multiply by the _____
 - Choose _____ values of x to find A, B, C , etc.
 - Or create a _____ of linear equations based on the _____ of x .

Find the partial fractions $\frac{x+8}{x^2+6x+8}$

$$\frac{3x^2 - x + 5}{x^3 - 2x^2 + x}$$

$$\frac{6x^3 + 16x}{(x^2 + 3)^2}$$

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8-05 Systems of Inequalities

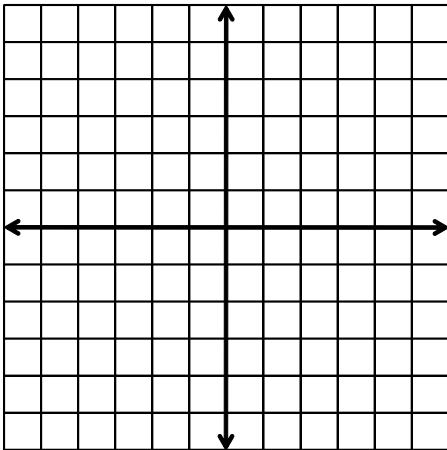
Solve Systems of Inequalities

- Graph _____ the inequalities on the _____ coordinate plane.
- Find the _____ of the _____ areas.

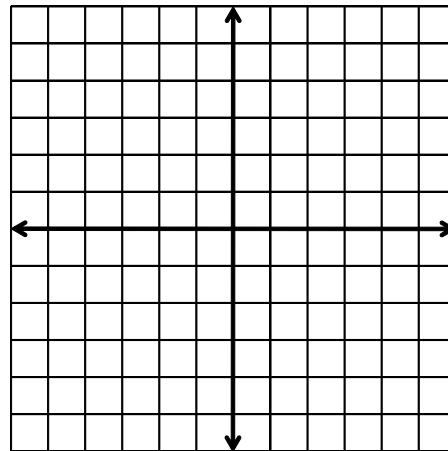
Graph an Inequality

- Pretend the inequality sign is = and _____ the line.
- Decide if the line is _____ or _____
 - Solid if _____
 - Dotted if _____
- _____
 - Pick a _____ point _____ on the line.
 - _____ the test point into the inequality
 - If this results in a _____ statement, then shade the side of the graph _____ the test point.
 - If the result is _____ a true statement, then shade the _____ side of the graph.
 - OR if solved for _____
 - $y >$ shade _____ the line.
 - $y <$ shade _____ the line.

$$\text{Solve } \begin{cases} x + y \geq 1 \\ -x + y \geq 1 \\ y \leq 2 \end{cases}$$



$$\text{Solve } \begin{cases} y \geq x^2 \\ y > x + 2 \end{cases}$$



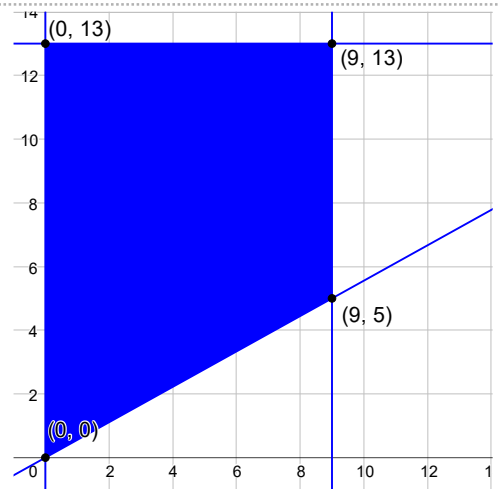
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8-06 Linear Programming

- _____ strategy
 - _____ or _____
- _____ function to optimize
- _____ - system of inequalities

Steps for Linear Programming

1. Graph _____ and find _____ of solution
 - Max or min will be at _____
2. Plug _____ into _____ function to find min or max



Find the minimum value of $z = 4x + 6y$ subject to

$$\begin{cases} x \geq 0 \\ y \geq 0 \\ x + y \geq 2 \\ y \leq 4 \\ x \leq 5 \end{cases}$$

