Mr. Wright's Math Extravaganza

Precalculus

Systems of Equations and Inequalities

Level 2.0: 70% on test, Level 3.0: 80% on test, Level 4.0: level 3.0 and success on applications

Score	I Can Statements
4.0	☐ I can demonstrate in-depth inferences and applications that go beyond what was taught.
3.5	In addition to score 3.0 performance, partial success at score 4.0 content
3.0	☐ I can solve systems of linear and nonlinear equations. ☐ I can solve systems of inequalities by graphing.
2.5	No major errors or omissions regarding score 2.0 content, and partial success at score 3.0 content
2.0	☐ I can solve systems of equations by graphing. ☐ I can solve systems of equations by substitution. ☐ I can solve systems of linear equations by elimination. ☐ I can solve systems of linear equations by putting it into row-echelon form using elementary row operations. ☐ I can decompose rational expressions into partial fractions. ☐ I can find the vertices of the a graph of a system of inequalities. ☐ I can use linear programming to minimize or maximize a function.
1.5	Partial success at score 2.0 content, and major errors or omissions regarding score 3.0 content.
1.0	With help, partial success at score 2.0 content and score 3.0 content.
0.5	With help, partial success at score 2.0 content but not at score 3.0 content.
0.0	Even with help, no success.

Richard Wright

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!

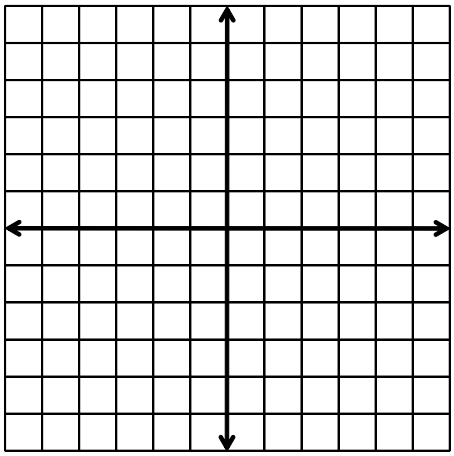
Solve $\begin{cases} -2x + y = 5 \\ x^2 + 3x - y = 1 \end{cases}$

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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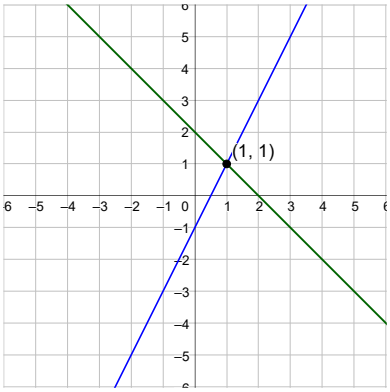
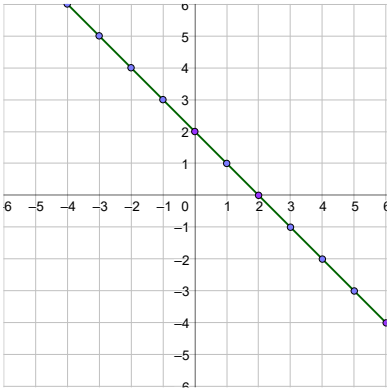
8-02 Two-Variable Linear Systems

Three possibilities for solutions

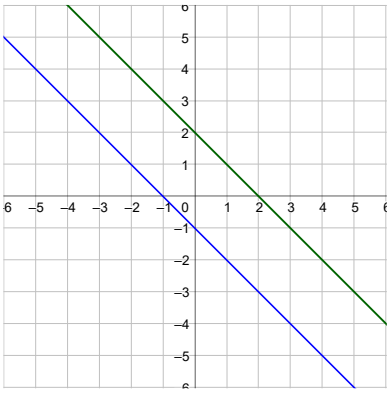
- 1 Solution: _____ and _____



- 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 _____.

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

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

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

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

1. _____the denominator.
2. For each _____factor of the denominator are in the form

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

3. For each _____factor of the denominator are in the form

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

4. _____for A, B, C, etc.
5. Multiply by the _____
   a. Choose _____values of x to find A, B, C, etc.
   b. 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

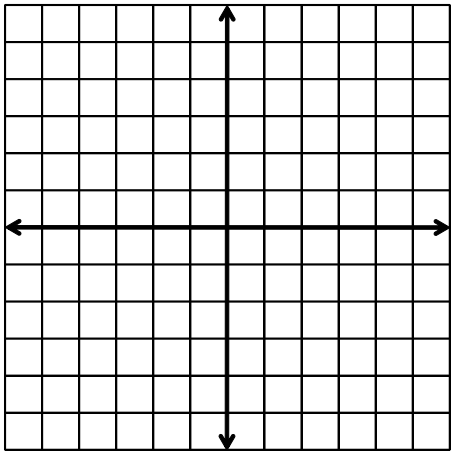
Solve Systems of Inequalities

1. Graph _____the inequalities on the _____coordinate plane.
2. Find the _____of the _____areas.

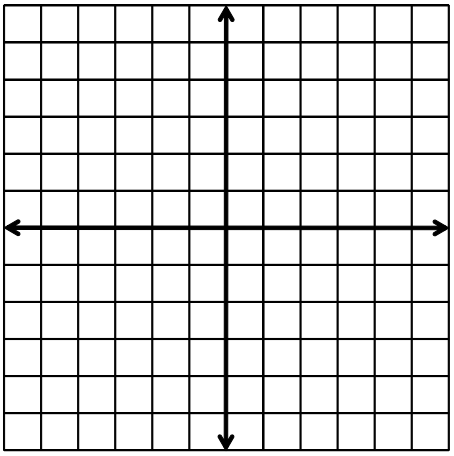
Graph an Inequality

1. Pretend the inequality sign is = and _____the line.
2. Decide if the line is _____or _____
   a. Solid if _____
   b. Dotted if _____
3. _____
   a. Pick a _____point _____on the line.
   b. _____the test point into the inequality
      i. If this results in a _____statement, then shade the side of the graph _____the test point.
      ii. If the result is _____a true statement, then shade the _____side of the graph.
   c. OR if solved for _____
      i. $y >$ shade _____the line.
      ii. $y <$ shade _____the line.

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



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



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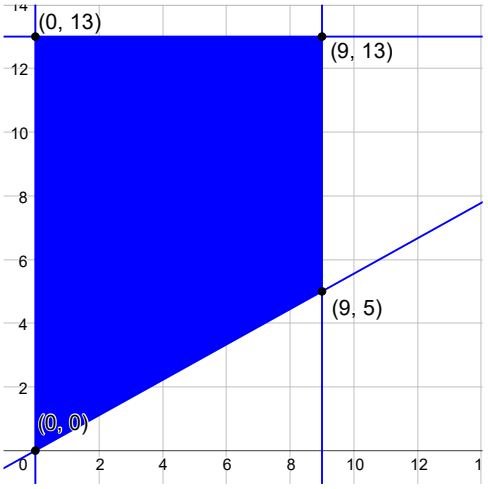
8-06 Linear Programming

- _____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

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