Solving Linear Systems by Substitution Method

To use the Substitution Method, you can replace one variable with an equivalent expression containing the other variable. This makes a one-variable equation.

1. $y = 2x + 3$
   $y = -2x - 9$

- Substitute $2x+3$ for y in the 2^{nd} equation.
- Solve for x.

$2x+3 = -2x-9$
$+2x \quad +2x$
$4x+3 = -9$
$-3 \quad -3$
$\frac{4x}{4} = \frac{-12}{4}$
$x = -3$

- Remember that the solution must be a point (x, y).
- Pick one of the equations.
- Substitute $x=-3$ into the equation.
- Solve for y.

$y = 2(-3)+3$
$= -6+3 = -3$

- Write your solution as a point.

$(-3,-3)$ is the point of intersection of the two lines on the graph.

2. $x = 2y - 7$
   $2x + 4y = 10$

- Substitute $2y-7$ for x in the 2^{nd} equation.
- Solve for y.

$2(2y-7)+4y=10$
$4y-14+4y=10$
$8y-14=10$
$+14 \quad +14$
$\frac{8y}{8}=\frac{24}{8}$
$y=3$

- Remember that the solution must be a point (x, y).
- Pick one of the equations. *The first one is more efficient here
- Substitute $y=3$ into the equation.
- Solve for x.

$x=2(3)-7$
$=6-7=-1$

- Write your solution as a point.

$(-1,3)$ is the point of intersection of the lines on the graph.

→ **The solution to a system of equations is the** point of intersection.