

# Solving Systems of Equations Algebraically

Substitution



## **Solving Linear Systems Algebraically**

- Step 1:** Solve one of the equations for one of its variables
- Step 2:** Substitute the expression from **Step 1** into the other equation and solve for the other variable
- Step 3:** Substitute the expression from **Step 2** into the revised equation from Step 1 and solve



1. 
$$\begin{cases} 3x + 4y = -4 \\ x + 2y = 2 \end{cases}$$

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

3. 
$$\begin{cases} 2x - 4y = 13 \\ 4x - 5y = 8 \end{cases}$$

4. 
$$\begin{cases} 2x - 6y = 19 \\ -3x + 2y = 10 \end{cases}$$



5.  $-x + 3y = 1$   
 $4x + 6y = 8$

6.  $2x + 3y = -1$   
 $-5x + 5y = 15$

7.  $7x - 12y = -22$   
 $-5x + 8y = 14$

8.  $x - 2y = 3$   
 $2x - 4 = 7$



9.  $9x - 5y = -7$   
 $-6x + 4y = 2$

10.  $6x - 10y = 12$   
 $-15x + 25y = -30$



**Closure: When solving a linear system algebraically, how do you know when there is no solution? How do you know when there are infinitely many solutions?**



# Homework

Solve each system by substitution.

1)  $y = 6x - 11$   
 $-2x - 3y = -7$

2)  $2x - 3y = -1$   
 $y = x - 1$

3)  $y = -3x + 5$   
 $5x - 4y = -3$

4)  $-3x - 3y = 3$   
 $y = -5x - 17$

5)  $y = -2$   
 $4x - 3y = 18$

6)  $y = 5x - 7$   
 $-3x - 2y = -12$