A system of equations is a collection of equations in which the number of equations equals the number of variables (unknowns).

- Two equations with two unknowns
- Three equations with three unknowns
- Four equations with four unknowns

In this section, we will deal only with two equations and two unknowns.

Identifying Conics

No squared terms		Line	
	$+ax$	Slopes up	/
	$-ax$	Slopes down	\
One squared term		Parabola	
	$+ax^2$	Opens up	$\cup$
	$-ax^2$	Opens down	$\cap$
	$+by^2$	Opens right	$\subset$
	$-by^2$	Opens left	$\supset$
Two squared terms			
Both squared terms positive		Ellipse or Circle	
	$+ax^2+by^2$		
One squared term positive		Hyperbola	
	$+ax^2-by^2$	Opens left and right	$\supset$ $\subset$
	$-ax^2+by^2$	Opens up and down	$\cup$ $\cap$

Intersecting Conics

	Line	Parabola	Ellipse	Hyperbola
Line	0, 1, ∞	0, 1, 2	0, 1, 2	0, 1, 2
Parabola	0, 1, 2	0, 1, 2, ∞	0, 1, 2, 3, 4	0, 1, 2, 3, 4
Ellipse	0, 1, 2	0, 1, 2, 3, 4	0, 1, 2, 3, 4, ∞	0, 1, 2, 3, 4
Hyperbola	0, 1, 2	0, 1, 2, 3, 4	0, 1, 2, 3, 4	0, 1, 2, 3, 4, ∞

There are three methods for solving a system of equations:

1. Substitution

    1. Select a variable for substitution.
        a. Look for a linear variable that will be easy to solve for.
    2. Solve the first equation for that variable. The variable is now equivalent to an expression.
    3. Substitute the variable in the second equation with the expression from the first.
    4. Solve for the remaining variable.
    5. Back-substitute the value from step 4 into the expression from step 2 to find the value of the first variable.

2. Elimination

    1. Select a variable to eliminate.
        a. Look for a variable that already has opposite signs.
    2. Determine the LCD for the coefficients of that variable.
    3. Multiply each equation by the appropriate factor so the variable coefficients are equal but opposite in sign.
    4. Add the equations. The chosen variable should be eliminated.
    5. Solve for the remaining variable.
    6. Back-substitute the value from step 4 into one of the original equations and solve for the other variable

3. Graphical

    This method works best when the equations can be put in the form y=f(x).

    1. Put each equation in the form y=f(x). In other words, solve for y.
    2. Graph both equations simultaneously.
    3. The points of intersection are the solutions to the system.