**Section 5.4—Systems of Nonlinear Equations in Two Variables**

**System of Nonlinear Equations**—contains at least one equation that cannot be expressed in the form ; also called a nonlinear equation

**Solution Set**—set of all solutions to a system

Unlike linear systems these graphs can be circles, parabolas, or anything other than two lines.

We solve a nonlinear system using either the substitution or addition method.

**Solving a Nonlinear System Using Substitution**

1. Solve one of the equations for one of the variables in terms of the other.
2. Substitute the expression from step 1 into the other equation.
3. Solve the resulting equation containing one variable.
4. Back-substitute the value(s) into the equation from step 1.
5. Check the proposed solutions in both of the given equations.

**Example**—Solve using substitution

**Steps for Solving a Nonlinear System Using Addition**

1. Write both equations in the form
2. Multiply either or both equations so that the sum of one of the coefficients is 0.
3. Add the equations and solve for the remaining variable.
4. Back-substitute to find the remaining variable.
5. Check.

**Example**—Solve using addition: