

$$x + 7y = 25$$

$$x^2 + y^2 = 25$$

Solution(s):

- Enter your answers as points:  $(x, y)$
- Because these systems are non-linear, you may have more than one solution.
- If you have more than one solution, enter your answers as a list of points:  $(x_0, y_0), (x_1, y_1)$
- Use 'sqrt(...)' to enter radical answers, do not use decimal approximations.

Hint:

Solution:

# Substitution

b/c no like terms.

$$x = 25 - 7y$$

$$x^2 + y^2 = 25$$

$$(25 - 7y)^2 + y^2 = 25$$

$$625 - 2(25)(7y) + 49y^2 + y^2 = 25$$

$$50y^2 - 350y + 625 - 25 = 0$$

$$50y^2 - 350y + 600 = 0$$

$$50(y^2 - 7y + 12) = 0$$

$$50 \neq 0$$

$$(y - 4)(y - 3) = 0$$

$$\begin{array}{r} y - 4 = 0 \\ + 4 \quad + 4 \\ \hline \end{array}$$

$$y = 4$$

$$\begin{array}{r} y - 3 = 0 \\ + 3 \quad + 3 \\ \hline \end{array}$$

$$y = 3$$

Solve for  $x$ .

Note: Try to avoid  
substituting into  
a conic equation.

(We'll show you why later.)

$$x + 7y = 25$$

$$\text{Let } y = 4$$

$$x + 7(4) = 25$$

$$x + 28 = 25$$

$$x = -3$$

$$\rightarrow (-3, 4)$$

is a solution

$$\text{Let } y = 3$$

$$x + 7(3) = 25$$

$$x + 21 = 25$$

$$x = 4$$

$$\rightarrow (4, 3)$$

is a solution

°° Solutions

$$(x, y) \in \{(-3, 4), (4, 3)\}$$

Question: Why not sub  
into conic equation  
 $x^2 + y^2 = 25$

$$\text{Let } y = 3$$

$$x^2 + (3)^2 = 25$$

$$x^2 + 9 = 25$$

$$x^2 = 16$$

$$x = \pm 4 \rightarrow (3, -4), (3, 4)$$

are solutions?

$$x + 7y = 25 \leftarrow \text{Check.}$$

$$(3) + 7(-4) = 25$$

$$3 - 28 = 25$$

$$-25 \neq 25$$

~~$\rightarrow (3, -4)$  is not a solution~~

Recall linear equation

$$ax + b = c.$$

How many solutions for  $x$ ? 1

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Recall quadratic equation.

$$ax^2 + bx + c = d$$

How many solutions for  $x$ ? 2

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Always pick equation  
more likely to give you  
fewer REAL solutions.  
when substituting.