

Systems of Quadratic + Linear Equations

ex: $x^2 + y^2 + 27x + y - 60 = 0$
 $3x + y - 4 = 0$

$3x + y - 4 = 0$
 $y = -3x + 4$

$x^2 + (-3x+4)^2 + 27x + (-3x+4) - 60 = 0$
 $x^2 + 9x^2 - 24x + 16 + 27x - 3x + 4 - 60 = 0$

$10x^2 - 40 = 0$
 $+40 \quad +40$

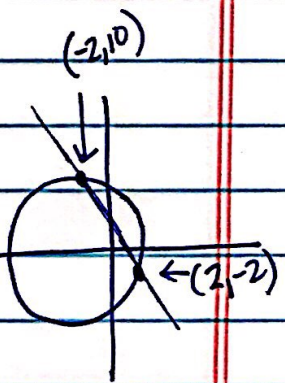
$\frac{10x^2}{10} = \frac{40}{10}$

$\sqrt{x^2} = \pm \sqrt{4}$

$x = \pm 2$

$y = -3(2) + 4 = -2 \Rightarrow (2, -2)$

$y = -3(-2) + 4 = 10 \Rightarrow (-2, 10)$



- ### Steps
- solve the linear equation for x or y
 - substitute the x or y value into the quadratic equation
 - solve for the remaining variable
 - substitute into the linear eq. to get the other value

Solutions
 $(2, -2)$
 $(-2, 10)$

ex: $x^2 - 3y^2 - 4x - y + 3 = 0$
 $2x + y - 2 = 0$

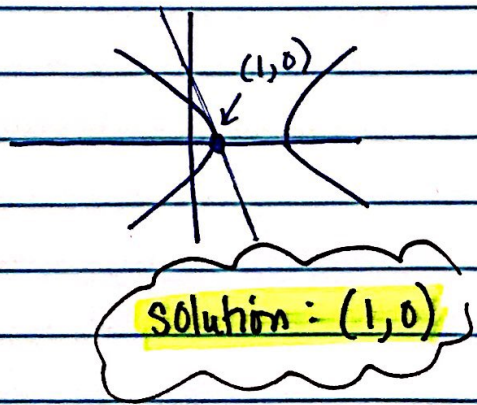
$y = -2x + 2$

$x^2 - 3(-2x+2)^2 - 4x - (-2x+2) + 3 = 0$

$x^2 - 3(4x^2 - 8x + 4) - 4x + 2x - 2 + 3 = 0$

$x^2 - 12x^2 + 24x - 12 - 2x + 1 = 0$

$-11x^2 + 22x - 11 = 0 \Rightarrow x^2 - 2x + 1 = 0 \Rightarrow (x-1)(x-1) = 0 \Rightarrow x = 1 \Rightarrow y = 2(1) + 2 = 0$



Solution: (1, 0)