

4.4

ex: The school's drama department is putting on a production. Instead of using the school's indoor stage, the department decided to build an outdoor stage to accommodate a great audience. The width of the stage needs to be 6ft less than the length. If the total area needs to cover 720 ft², what should be the dimensions of the length and the width?

$$w = L - 6$$

$$L \times w = 720$$

$$L(L-6)$$

$$L^2 - 6L = 720$$

$$L^2 - 6L - 720$$

$$\frac{6 \pm \sqrt{6^2 - 4(1)(-720)}}{2(1)}$$

$$\frac{6 \pm \sqrt{2916}}{2}$$

$$\frac{6 \pm 54}{2}$$

$$\begin{array}{l} \text{width} = 24 \text{ ft} \\ \text{length} = 30 \text{ ft} \end{array}$$

Solving Nonlinear Equations: substitute, solve, then plug all answers back into one of the equations.

1) $x^2 + (y-2)^2 = 7$

$y = x - 3$

$(1, -2)$
 $(4, 1)$

$x^2 + (x-3-2)^2 = 7$

$x^2 + (x-5)^2 = 7$

$x^2 + (x-5)(x-5) = 7$

$x^2 + x^2 - 5x - 5x = 7$

$2x^2 - 10x + 8 = 0$

$\frac{10 \pm 6}{4}$

$\frac{10 \pm \sqrt{100 - 4(2)(8)}}{4}$

$x = 1, 4$

2) $y = x^2 - 6x + 10$

$y = 2x + 1$

$x^2 - 6x + 10 = 2x + 1$

$x^2 - 8x + 9 = 0$

$\frac{8 \pm \sqrt{64 - 4(1)(9)}}{2(1)}$

$2(1)$

$\frac{8 \pm \sqrt{25}}{2}$

$\frac{25}{2}$
 $\frac{17}{2}$
 $\frac{7}{2}$
 $\frac{1}{2}$

$y = 2(4 - \sqrt{7}) + 1$
 $= 8 - 2\sqrt{7} + 1$
 $= 9 - 2\sqrt{7}$

$(4 + \sqrt{7}, 9 + 2\sqrt{7})$

$(4 - \sqrt{7}, 9 - 2\sqrt{7})$

3) $y = -4x - 10$

$y = x^2 - 4x - 1$

$-4x - 10 = x^2 - 4x - 1$

$0 = x^2 + 9$

$\pm 3i = x$

No solution

★ If you get an imaginary answer, that means the graphs don't intersect and there is no solution