Use substitution to find where the linear and quadratic equations intersect.

1. $y = x^2 + 7x + 12$
① $-8x + 4y = 32 \Rightarrow y = 2x + 8$

② $2x + 8 = x^2 + 7x + 12$

③ $0 = x^2 + 5x + 4$

④ $0 = (x+4)(x+1)$

$x = -4 \quad x = -1$

⑤ $y = 2(-4) + 8 = 0$

$y = 2(-1) + 8 = 6$

⑥ $(-4, 0)$ & $(-1, 6)$

STEPS:

① Solve each equation for y.

② Substitute

③ rewrite your equation in Standard form and set it equal to zero.

④ Solve for x.

⑤ dont forget to solve for y.

⑥ Express as coordinates

2. $y = x^2$
$6x + 3y = -3$

$6x + 3x^2 = -3$

$3x^2 + 6x + 3 = 0$

$3(x^2 + 2x + 1) = 0$

$3(x+1)(x+1) = 0$

$\boxed{x = -1}$

$\boxed{y = 1}$

$\boxed{(-1, 1)}$

3. $y = -x^2 + 6x - 3$
$x + y = 7 \Rightarrow y = -x + 7$

$-x + 7 = -x^2 + 6x - 3$

$x^2 - 7x + 10 = 0$

$(x-5)(x-2) = 0$

$x = 5 \quad x = 2$

$y = -5 + 7 = 2$

$y = -2 + 7 = 5$

$\boxed{\begin{matrix}(5, 2)\\(2, 5)\end{matrix}}$

4. $y = -x^2 + 4$
$2x - 4y = -20$ $\Rightarrow y = \frac{1}{2}x + 5$

$\frac{1}{2}x + 5 = -x^2 + 4$

$x^2 + \frac{1}{2}x + 1 = 0$

$x = \frac{-\frac{1}{2} \pm \sqrt{(\frac{1}{2})^2 - 4(1)(1)}}{2(1)}$

$x = \frac{-6 \pm \sqrt{-3.75}}{2}$

$\boxed{\text{no Solution}}$

5. $y = x^2 - 4x - 2$
$-7x + 7y = -14$ $\Rightarrow y = x - 2$

$x - 2 = x^2 - 4x - 2$

$x^2 - 5x = 0$

$x(x-5) = 0$

$x = 0 \quad x = 5$

$y = 0 - 2 = -2$

$y = 5 - 2 = 3$

$\boxed{(0,-2) \quad (5,3)}$

6. $y = x^2 - 5x + 7$
$y = 2x + 1$

$2x + 1 = x^2 - 5x + 7$

$x^2 - 7x + 6 = 0$

$(x-6)(x-1) = 0$

$x = 6, \quad x = 1$

$y = 2(6) + 1 = 13$

$y = 2(1) + 1 = 3$

$\boxed{(6,13) \quad (1,3)}$

7. $x^2 + y^2 = 13$
$y = x + 1$

$x^2 + (x+1)^2 = 13$

$x^2 + x^2 + 2x + 1 = 13$

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

$2(x^2 + x - 6) = 0$

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

$x = -3 \quad x = 2$

$y = -3 + 1 = -2$

$y = 2 + 1 = 3$

$\boxed{(-3,-2) \ \& \ (2,3)}$