Functions & Trig. Name ______________________________

Solve Systems Algebraically

Solve the system algebraically.

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

$y - x = 1$

$y = x + 1$

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

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

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

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

$\quad\quad\quad\quad -13 \quad -13$

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

$x^2 + x - 6 = 0$

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

$x = -3 \quad\quad x = 2$

$y = x + 1 \quad\quad y = x + 1$

$y = -3 + 1 \quad\quad y = 2 + 1$

$y = -2 \quad\quad y = 3$

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

2.) A landscape architect's designs for a town park call for two parabolic-shaped walkways. When the park is mapped on a Cartesian coordinate plane, the pathways intersect at two points. If the equations of the curves of the walkways are $y = 11x^2 + 23x + 210$ and $y = -19x^2 - 7x + 390$, determine the coordinates of the two points of intersection. You solution must be done **algebraically**.

$11x^2 + 23x + 210 = -19x^2 - 7x + 390$

$+19x^2 + 7x - 390 \quad\quad +19x^2 + 7x - 390$

$30x^2 + 30x - 180 = 0$

$x^2 + x - 6 = 0$

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

$x = -3 \quad\quad x = 2$

$y = 11x^2 + 23x + 210 \quad\quad y = 11x^2 + 23x + 21$

$y = 11(-3)^2 + 23(-3) + 210 \quad\quad y = 11(2)^2 + 23(2) + 21$

$y = 240 \quad\quad y = 300$

$\boxed{(-3, 240), \quad (2, 300)}$

Solve the system algebraically.

3.) $(x-3)^2+(y+2)^2=16$
$2x+2y=10$

$-2x \quad -2x$

$\frac{2y}{2} = \frac{-2x}{2} + \frac{10}{2}$

$y = -x+5$

$(x-3)^2 + (-x+5+2)^2 = 16$

$(x-3)^2 + (-x+7)^2 = 16$

$(x-3)(x-3) + (-x+7)(-x+7) = 16$

$x^2-3x-3x+9 + x^2-7x-7x+49 = 16$

$2x^2-20x+58 = 16$

$-16 \quad -16$

$2x^2-20x+42 = 0$

$x^2-10x+21=0$

$(x-7)(x-3)=0$

$x=7 \qquad x=3$

$y=-x+5 \qquad y=-x+5$

$y=-7+5 \qquad y=-3+5$

$y=-2 \qquad y=2$

$\boxed{(7,-2) \quad (3,2)}$