Systems of Conics WS 1
A Circle and A Line

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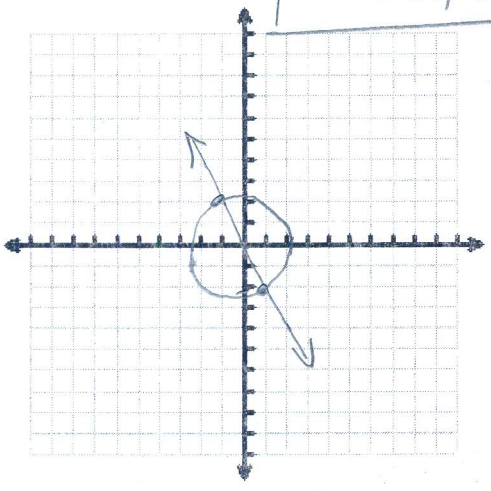
Solve the system graphically. Find the points of intersection, if any.

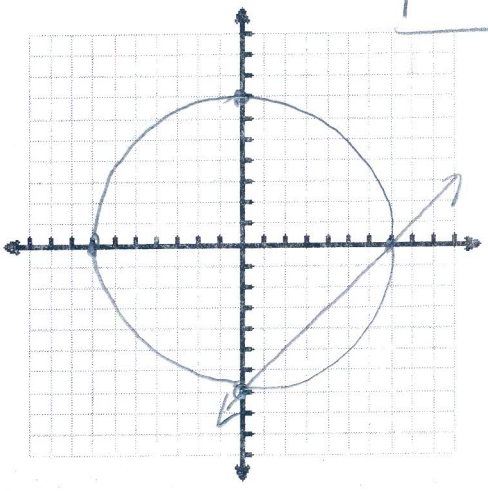
1. $x^2 + y^2 = 5$
$y = -2x$

(-1, 2) and (1, -2)



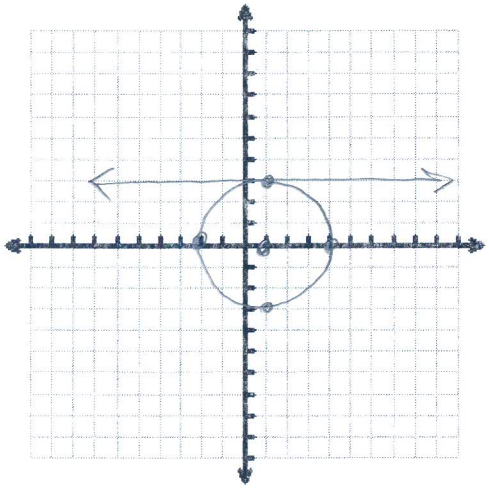
2. $x^2 + y^2 = 49$
$y = x - 7$

(0, -7) and (7, 0)

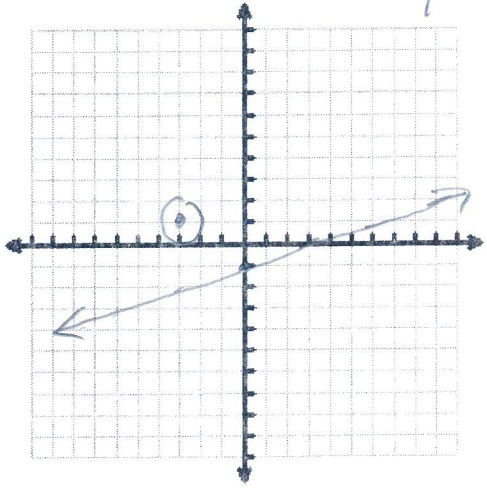


3. $(x-1)^2 + y^2 = 9$
$y = 3$

(1, 3)



4. $(x+3)^2 + (y-1)^2 = 1$
$x - 3y = 3$ $\rightarrow 3y = x - 3$
$y = \frac{1}{3}x - 1$



No Solution

Solve the system algebraically.

5. $x^2 + y^2 = 18$
$x - y = 0 \longrightarrow x = y$

$x^2 + y^2 = 18$

$\downarrow$

$x^2 + (x)^2 = 18$

$2x^2 = 18$

$x^2 = 9$

$x = 3$	$x = -3$
$y = 3$	$y = -3$

$(3, 3)\ (-3, -3)$

6. $x^2 + y^2 = 25$
$y = x + 1$

$\downarrow$

$x^2 + (x+1)^2 = 25$

$x^2 + x^2 + 2x + 1 = 25$

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

$x^2 + x - 12 = 0$

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

$x = -4$	$x = 3$
$y = -4 + 1$	$y = 3 + 1$

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

7. $x^2 - 2x + y^2 - 2y = 2$
$x + y = 4 \longrightarrow y = -x + 4$

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

$x^2 - 2x + x^2 - 8x + 16 + 2x - 8 = 2$

$2x^2 - 8x + 6 = 0$

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

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

$x = 3$	$x = 1$
$y = -3 + 4$	$y = -1 + 4$

$(3, 1)\ (1, 3)$

8. $x^2 + y^2 - 4x - 6y = -9$
$x + y = 1 \longrightarrow y = -x + 1$

$x^2 + (-x+1)^2 - 4x - 6(-x+1) = -9$

$x^2 + x^2 - 2x + 1 - 4x + 6x - 6 + 9 = 0$

$2x^2 + 4 = 0$

$2x^2 = -4$

$x^2 = -2$

$x = \pm i\sqrt{2}$

no solution!

Answers: 1. (−1, 2),(1, −2) 2. (7, 0), (0, −7) 3. (1, 3) 4. no solution
5. (3, 3), (−3, −3) 6. (−4, −3), (3, 4) 7. (3, 1), (1, 3) 8. no solution