Linear-Quadratic Systems

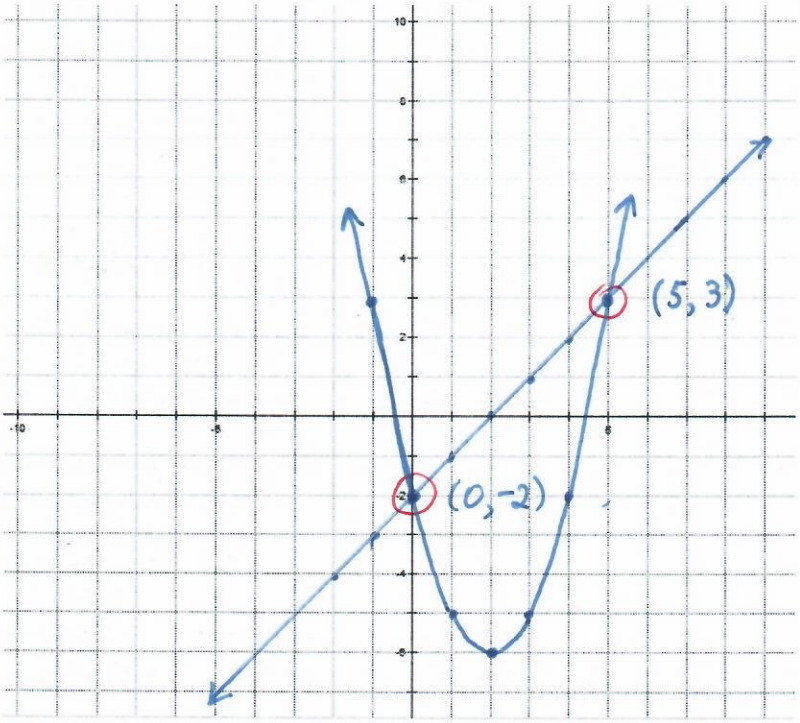
A system of equations is a group of two or more equations considered to be true at the same time. ✓

To solve a system of equations means to find the values of x and y that make all equations true. POIs!

To solve a linear-quadratic system means, then, to find the points of intersection of the given linear and quadratic relations. This could be done both graphically and algebraically.

1. **Graphical method**

$$\begin{cases} y = x - 2 & \text{(linear relation)} \\ y = x^2 - 4x - 2 & \text{(quadratic relation)} \end{cases}$$



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

$y = \underbrace{x^2 - 4x + 4}_{PST} - 4 - 2$

$y = (x-2)^2 - 6$

$V(2, -6)$

The shape of the graph of $y = x^2 - 4x - 2$ is the same as that for $y = x^2$ ✓

$\therefore$ POIs: $(5, 3)$ and $(0, -2)$ ✓

lattice points: points with integer coordinates.

2. **Algebraic method**

$$\begin{cases} y = x - 2 & ① \\ y = x^2 - 4x - 2 & ② \end{cases}$$

$y = y$

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

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

$x^2 - 5x = 0$

$x(x-5) = 0 \rightarrow x = 0$ or $x - 5 = 0$

$x = 5$

$y = 0 - 2$

$y = -2$

POI $(0, -2)$

$y = 5 - 2$

$y = 3$

$(5, 3)$