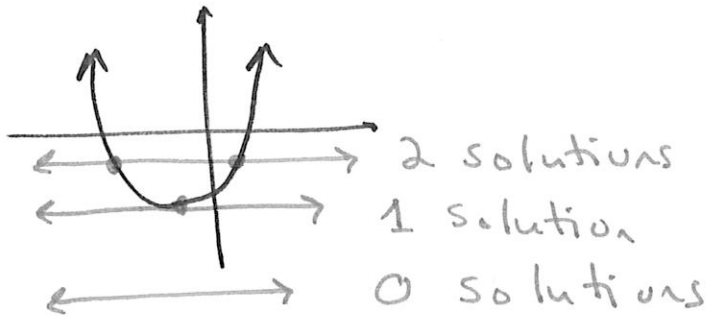
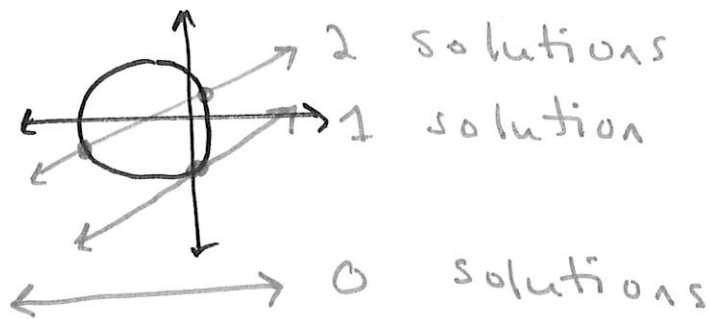


Nonlinear Systems of Equations

Ex: Parabola and Line



Ex: Circle and Line

**Ex 1**

Solve the system

$$x^2 - y = 4 \quad \leftarrow \text{parabola } (y = x^2)$$

$$-x + y = -2 \quad \leftarrow \text{line } (x')$$

Substitution: $\hookrightarrow y = -x - 2$

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

$$x^2 + x + 2 = 4$$

$$x^2 + x + 2 = 4$$

$$\begin{array}{r} -4 \quad -4 \\ \hline \end{array}$$

$$a=1 \quad b=1 \quad c=-2$$

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

$$(x-1)(x+2) = 0$$

$$ac \quad b$$

$$\begin{array}{r} -2 \quad | \quad 1 \\ \hline 2(-1) \quad | \quad 2-1=1 \end{array}$$

$$x-1=0$$

$$\begin{array}{r} +1 \quad +1 \\ \hline \end{array}$$

$$x=1$$

$$x+2=0$$

$$\begin{array}{r} -2 \quad -2 \\ \hline \end{array}$$

$$x=-2$$

Plug in $x=1$ and $x=-2$ to find y values.

$$x+y = -2$$

$$\begin{array}{r} 1+y = -2 \\ -1 \quad -1 \\ \hline \end{array}$$

$$y = -3$$

$$(1, -3)$$

$$x+y = -2$$

$$\begin{array}{r} -2+y = -2 \\ +2 \quad +2 \\ \hline \end{array}$$

$$y = 0$$

$$(-2, 0)$$

Check by graphing:

$$x^2 - y = 4$$

$$\begin{array}{r} -4 \quad +y \quad -4 \quad +y \\ \hline x^2 - 4 = y \end{array}$$

$$x+y = -2$$

$$\begin{array}{r} -x \quad -x \\ \hline y = -x - 2 \end{array}$$