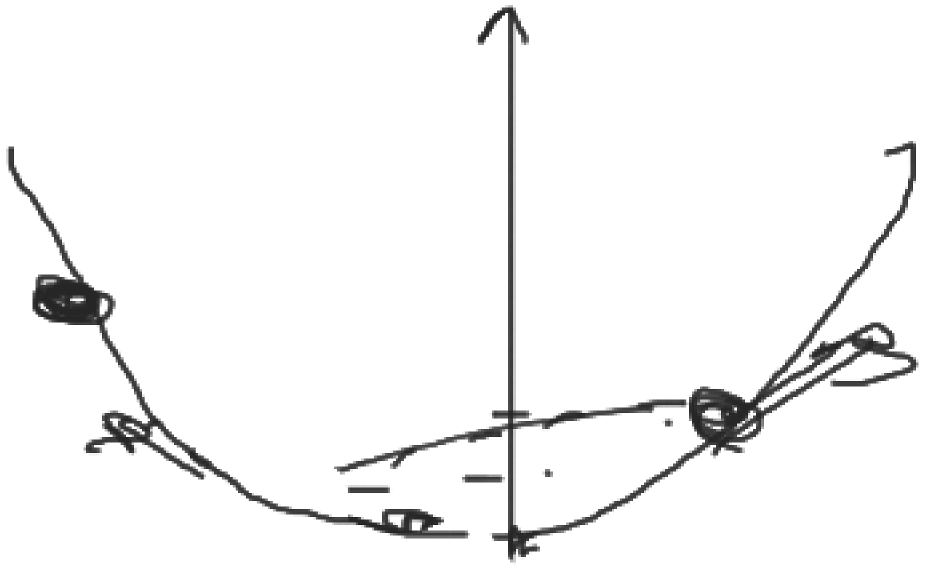
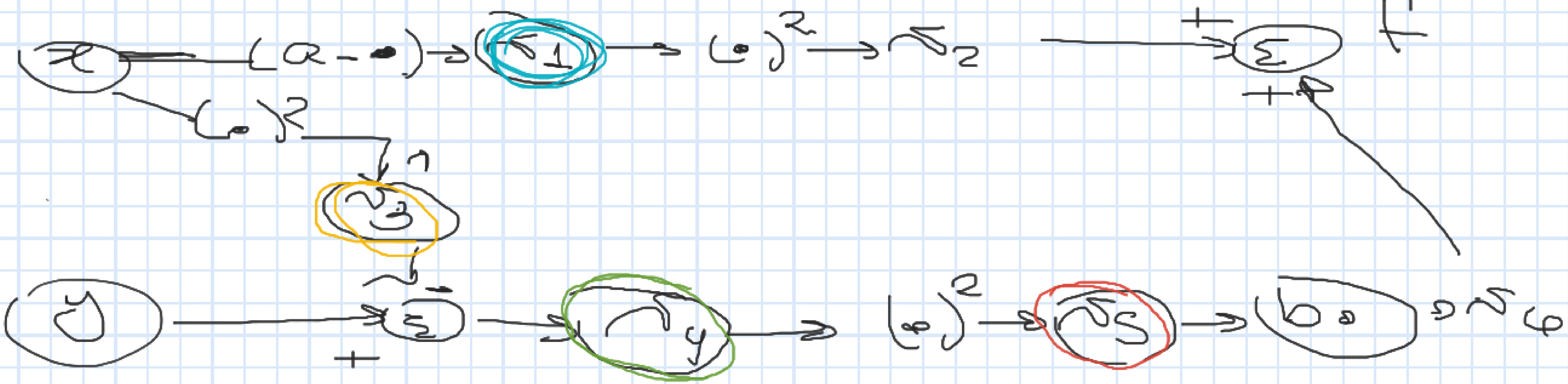


$f(x,y) = \underbrace{(a - x)}_{v_1}{}^2 + b(y - x^2)^2$



- resta
- prod por escalar
- suma
- square

$$\mathcal{L}(\underline{x}) = f(\underline{x}) + \mathbb{1}\{g_1(\underline{x}) \geq 0\} + \dots + \mathbb{1}\{g_m(x) \geq 0\} +$$
$$+ \mathbb{1}\{h_1(x) \neq 0\} + \dots + \mathbb{1}\{h_k(x) \neq 0\}.$$

min. $f(x) = (a-x)^2 + b(y-x^2)^2$

st $\quad x+y \leq 4$

$x+y-4 \leq 0$

$\mathcal{L}(x,y,\lambda) = (a-x)^2 + b(y-x^2)^2 + \lambda(x+y-4)$

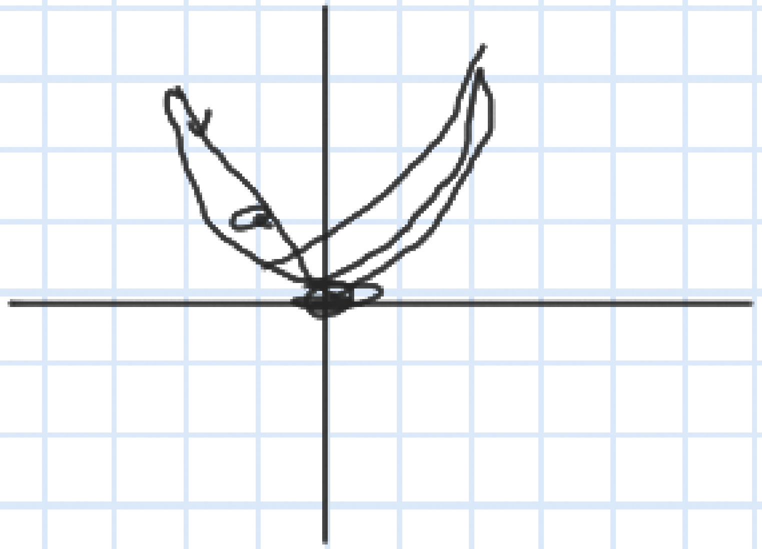
$\dfrac{\partial \mathcal{L}}{\partial x} = -2(a-x) + 2b(y-x^2)(-2x) + \lambda = 0$

$\dfrac{\partial \mathcal{L}}{\partial y} = 2b(y-x^2) + \lambda = 0$ $\Big\} \Rightarrow$ despejo λ, x, y y

$\dfrac{\partial \mathcal{L}}{\partial \lambda} = x+y-4 = 0$ consigo el mín

$f(x) = x^2 + y^2$

$$\min f(x) = x^2$$
$$\text{st. } x \leq -1$$



$$\mathcal{L}(x, \lambda) = x^2 + \lambda(x+1)$$

Problema dual

$$\max_{\lambda} \underbrace{\min_{x} \left(x^2 + \lambda(x+1)\right)}_{D(\lambda)}$$

$$\frac{\partial \mathcal{L}}{\partial x} = 2x + \lambda = 0$$
$$x = -\lambda/2.$$

$$D(\lambda) = (-\lambda/2)^2 + \lambda\left(-\frac{\lambda}{2} - 1\right)$$