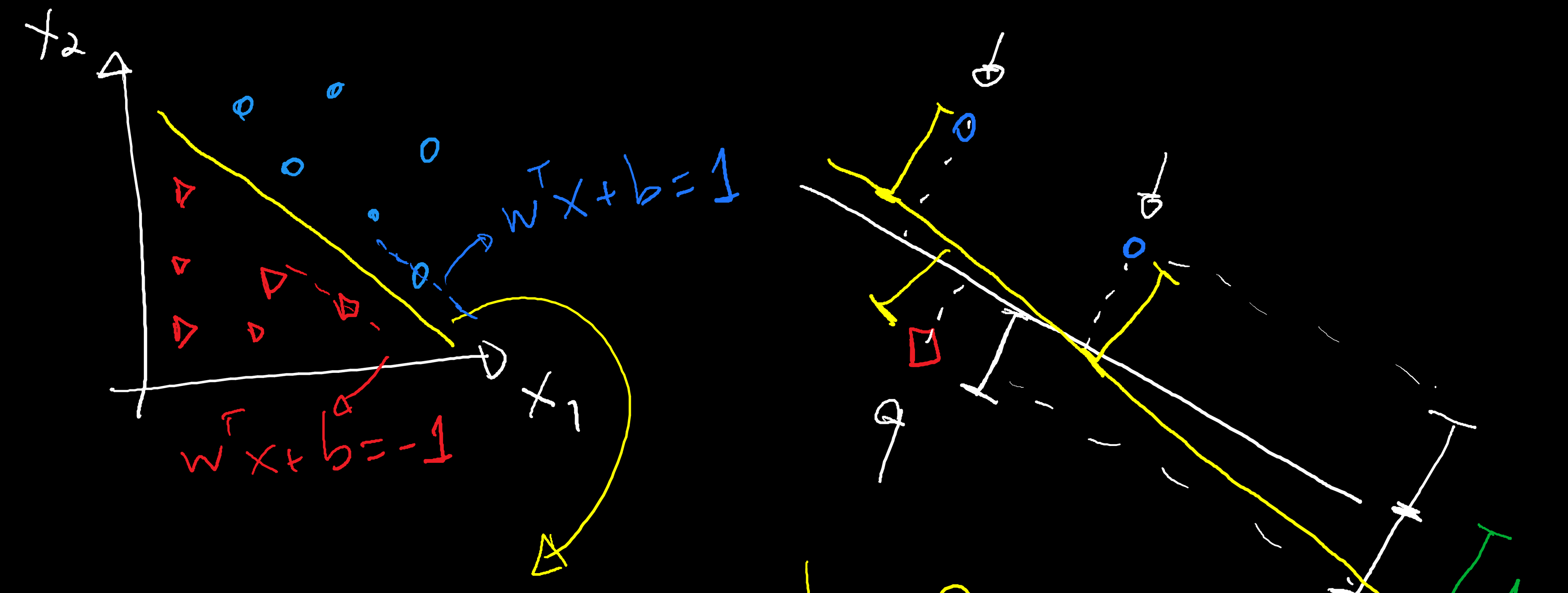


$w_1x_1+w_2x_2+b=0$ (w^Tx)

$w^Tx+b \geq 1 \rightarrow y_i = 1$

$-(w^Tx+b) \geq 1 \rightarrow y_i = -1$

$y_i(w^Tx_i+b) \geq 1 \quad i=1,\dots,n$

$\min_{w,b} \frac{1}{2}\|w\|^2$ (Quad.) s.a $y_i(w^Tx_i+b) \geq 1, \; i=1,\dots,n$ (lin. em w e b)

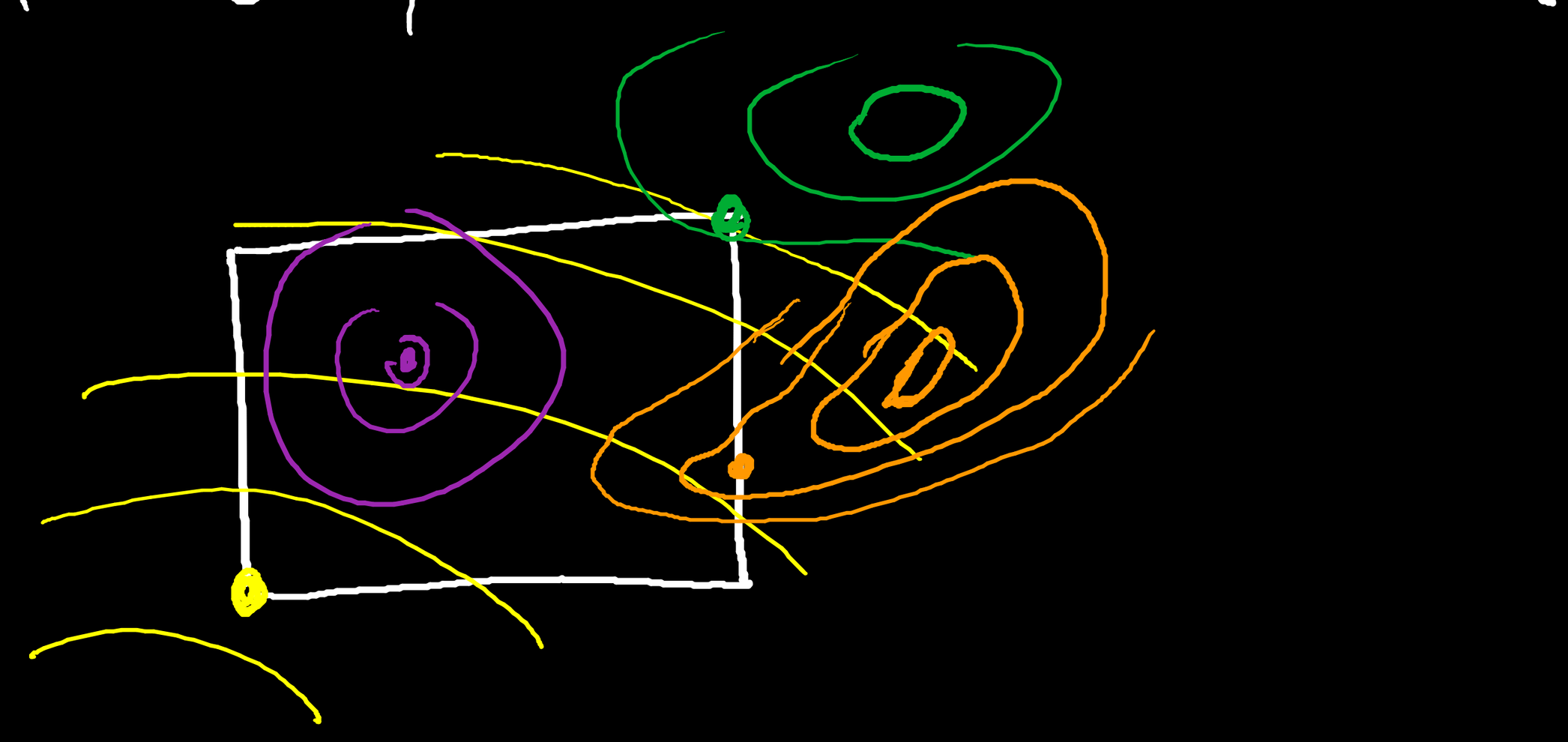
Maq. de Vet. Sup. – SVM

Dual: prob. quad. e rest. lin.

$\min f(x)$ s.a $l \leq x \leq u$

$l_i \leq x_i \leq u_i, \; i=1,\dots,n$

$l_i \in \mathbb{R}\cup\{-\infty\}, \quad u_i \in \mathbb{R}\cup\{+\infty\}$



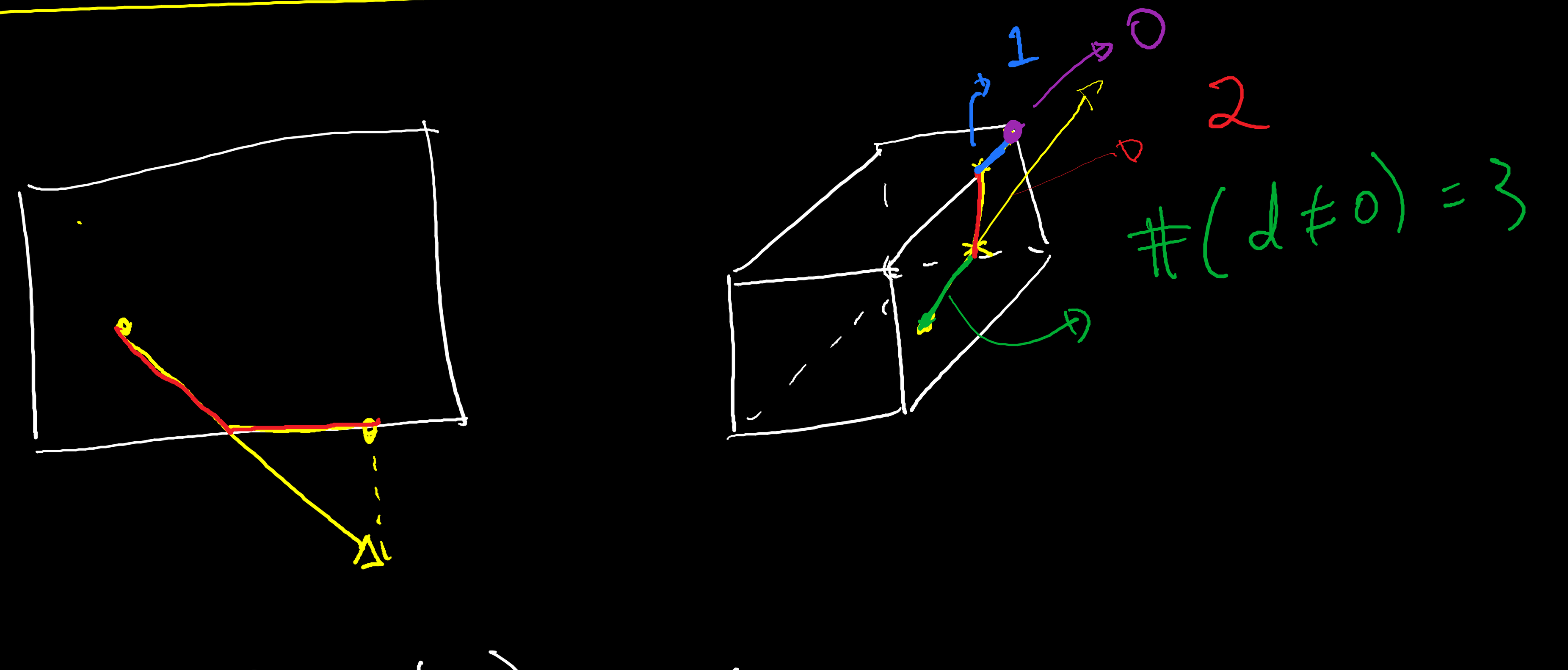
Projeção
$$P_\Omega(x)_i = \begin{cases} x_i & \text{se } l_i < x_i < u_i \\ l_i & \text{se } x_i \leq l_i \\ u_i & \text{se } x_i \geq u_i \end{cases}$$

clamp ; $\min\{u_i, \max\{l_i, x_i\}\}$ (3, 0)

Teo.: Se x^* é min. local de f suj. a $l \leq x \leq u$, então $l \leq x^* \leq u$ e
$$P(x^* - \nabla f(x^*)) = x^*$$
($g = \nabla f(x^*)$)

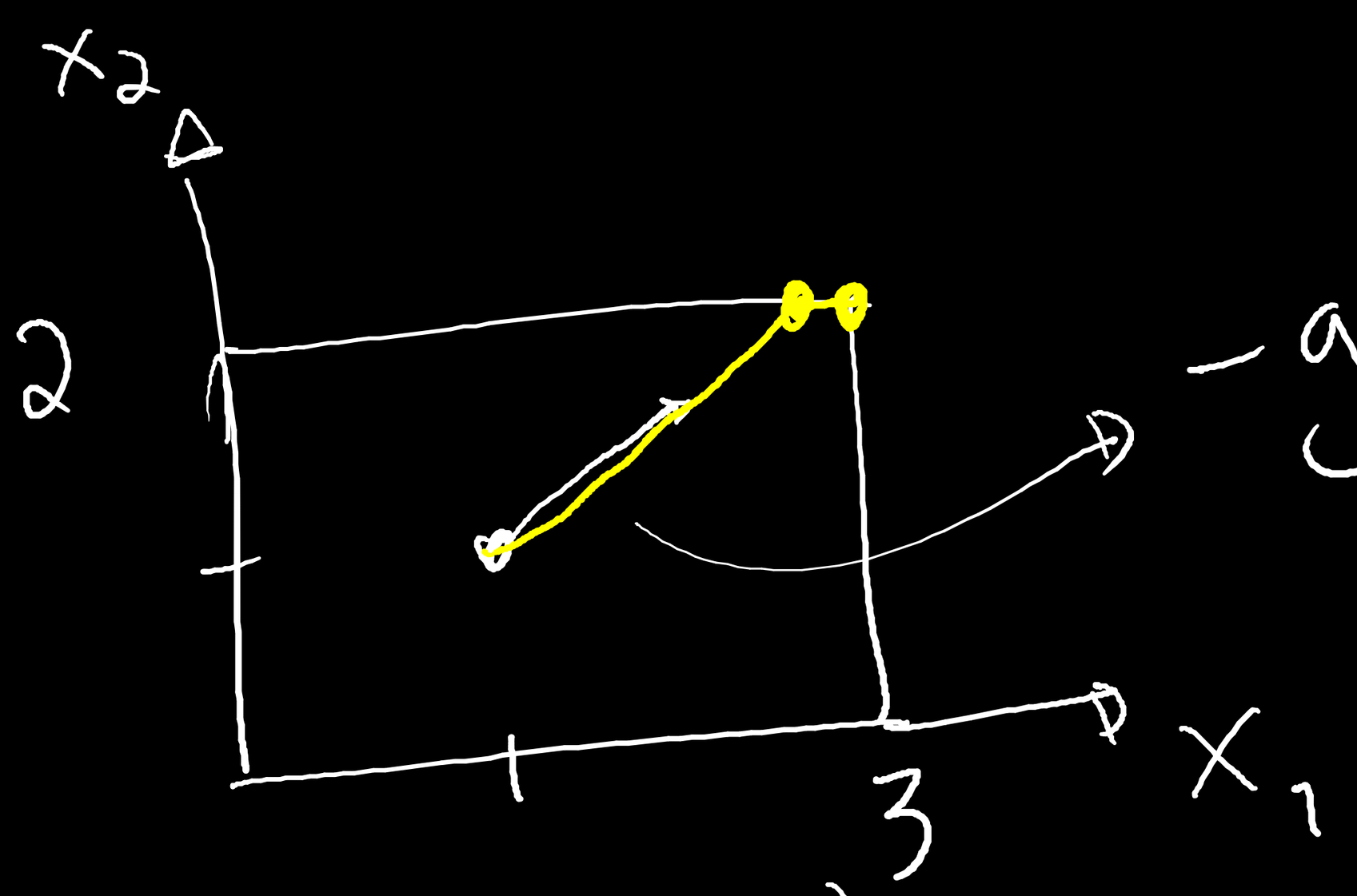
$P(x^*-g)_i = x_i$

$x_i = l_i$	$l_i < x_i < u_i$	$x_i = u_i$
$g_i \geq 0$	$g_i = 0$	$g_i \leq 0$



$d(t) = P(x-tg) - x$

$\{0, t_1, t_2, \dots, t_k\} \subset [0,1]$



$-g = \begin{pmatrix}7\\5\end{pmatrix}$

$1+7t=3 \rightarrow t=2/7$

$1+5t=2 \rightarrow t=1/5$

$P\left(\begin{pmatrix}1\\1\end{pmatrix}+t\begin{pmatrix}7\\5\end{pmatrix}\right) \rightsquigarrow$
