## Example

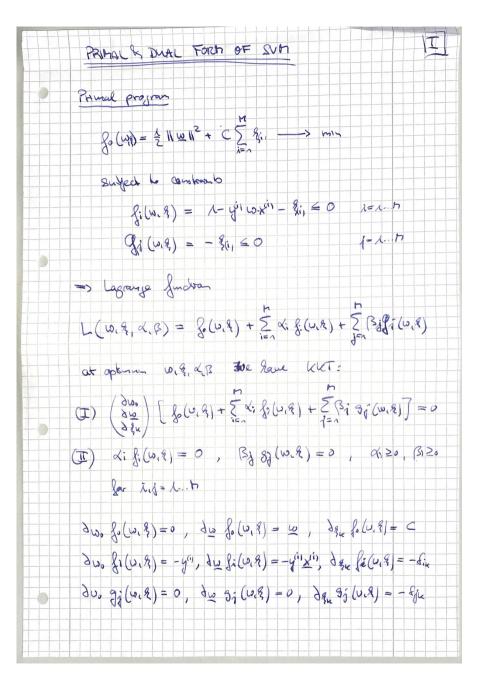
mm fo(x)=x2 subject to fr(x)=ax+L x \in 12

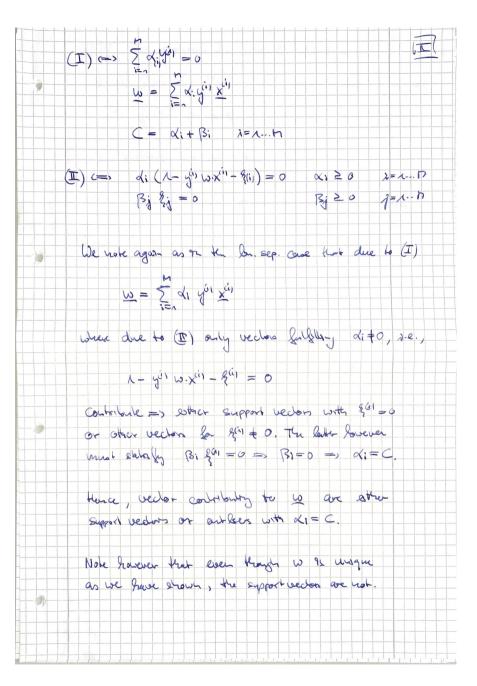
L(x18) = fo(x) + y-fr(x) for x612

 $\frac{1}{L}(b) = \frac{1}{2}\int_{\mathcal{L}(\mathcal{R})} \int_{\mathcal{L}(\mathcal{R})} \int_{\mathcal{L}(\mathcal{R})}$ 

 $\frac{d}{dx}\left(\frac{1}{9}(x) + \frac{1}{9}x + \frac{1}{9}x(x)\right) = 0$   $1x + \frac{1}{9}x = 0 \iff x = -\frac{1}{9}x = 0$   $\left(\frac{1}{9}(x) + \frac{1}{9}x +$ 

Sup L(b) = 2  $y_1 \ge 0$  $\frac{d}{dy_1} \left( -y_1^2 \frac{a^2}{4} + y_1 b \right) = -y_1 \frac{a^2}{2} + b = 0$   $\stackrel{(=)}{} y_1 = \frac{zb}{a^2}$ Sup  $L(b) = \begin{cases} \frac{2b}{a^2} & \text{for } b \ge 0 \Rightarrow x = -\frac{b}{a} \\ 0 & \text{for } b < 0 \Rightarrow x = 6 \end{cases}$ 





Dual program: Thank to the Whit Theen we know that I d. B s.t. 7 ( € fo ( w, 2) | \$; ( w, 2) ≤ 0 , 3; ( w, 2) ≤ 0 i=1... 1 = 1... 17 = 1.g L(w, \$, \$, \$, \$) = max 1.g L(w, \$, x, (\$)) Furthermore, by lever could we wood for to  $\mathbf{v} = \mathbf{v} \cdot \mathbf{x}^{(i)} \times \mathbf{x}^{(i)}$ =1 L(w\*, 3, x(B) = 2 \\ \bar{2} \dig(x') \|^2 + C\bar{2} \\ \bar{3}; + Edi (1- y) [w. + [xiya) xo, 7- ];) + = B; (- 3;) + 2(C - 2; - 8; 7 3; - w. 5 d; you Hence, we way formulate an equival to problem € ( ( (B) = E x: - = E x: x; y ing 6, xi, xg ) -> max Subject to dit Bi = C, di (Si > 0 CAS O S XI S C Exiy" = 0

NOTE: This program has several advantages: 1) de fo(x) = - yii xii. yi) xii what is negative evilled => fo (d) concave 2) Constant are all affect =) I! gotimum ad problem & always quadralec We can furthernore apress the activation output h(x) = wx by drowing one support vector Xxx, i.e., w Xxx = yxx and computery wo = yth - 10. xt => The activation does not depend on the particular values of X(1) but only an Inner products · Activator Sunda can be readily computed - dual form.