$f(x_1, x_2) > 0$

$x_2 = -x_1 + 2$

$(0,2)$

$f(x_1, x_2) = x_1 + x_2 - 2 = 0$

x_2

$(0,1)$ d
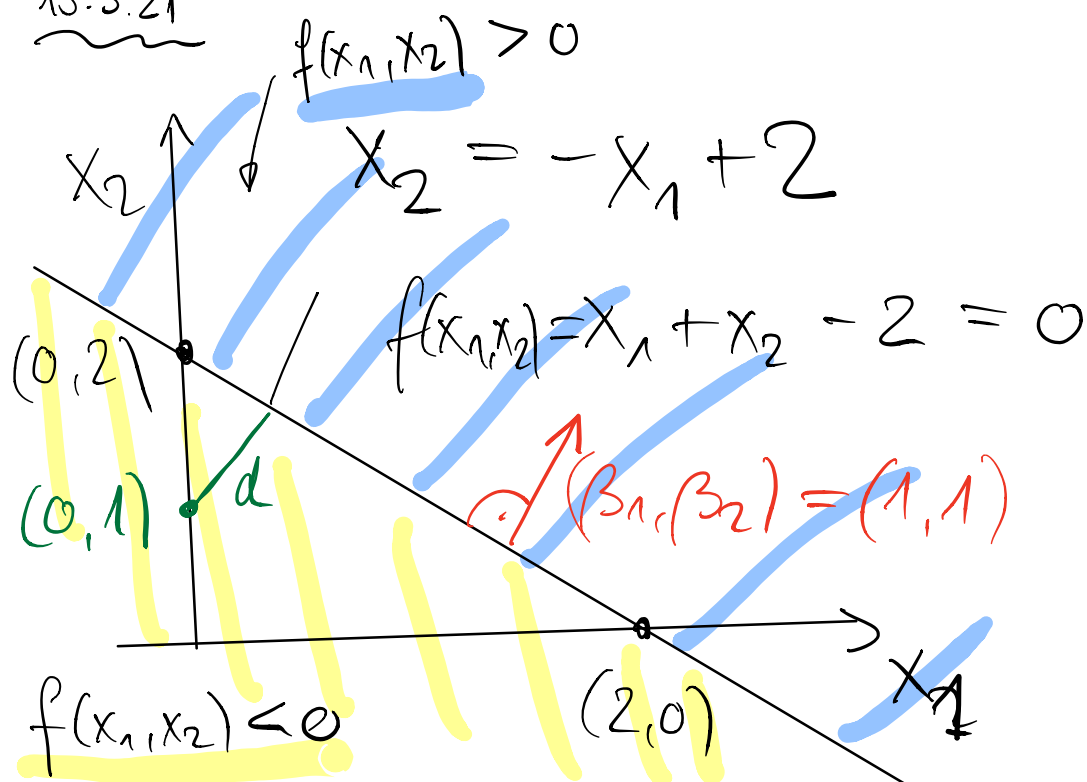
d $(\beta_1, \beta_2) = (1,1)$

$f(x_1, x_2) < 0$

$(2,0)$

x_1

$f(2,0) = 2 + 0 - 2 = 0 \checkmark$

if $\sum \beta_i^2 = 1$

Then: $\beta_0 + \beta_1 x_1 + \cdots + \beta_p \cdot x_p$

is the distance to the poin

$(x_1, \cdots, x_p)$

For example : $\beta_1 = \beta_2 = 1$

$$\sqrt{\beta_1^2 + \beta_2^2} = \sqrt{2}$$

$$\Rightarrow f(x_1, x_1) = \frac{1}{\sqrt{2}} x_1 + \frac{1}{\sqrt{2}} x_2 - \underbrace{\frac{2}{\sqrt{2}}}_{\sqrt{2}} = 0$$

$$f(0,1) = \frac{1}{\sqrt{2}} \cdot 0 + \frac{1}{\sqrt{2}} \cdot 1 - \sqrt{2} = \frac{1}{\sqrt{2}} - \frac{2}{\sqrt{2}} = \frac{-1}{\sqrt{2}}$$