1. convexity

$\forall x_1, x_2 \in C$

$\forall \theta \in [0,1]\ \theta x_1 + (1-\theta)x_2 \in C$

def $\sum_{i=1}^{k} \theta_i = \Sigma_k$

Base $k=2$ - - -

Induction $k+1$ $\left(\theta x_1 + \cdots + \theta_k x_k\right) + \theta_{k+1} \cdot x_{k+1} \quad \left(\sum_{i=1}^{k+1} \theta_i = 1\right)$

$= \frac{\Sigma_k}{\Sigma_k} [\quad\quad] + \theta_{k+1} x_{k+1}$

$= \Sigma_k \left(\frac{\theta_1}{\Sigma_k} x_1 + \cdots \frac{\theta_k}{\Sigma_k} x_k \right) + \theta_{k+1} x_{k+1} \in C$

$\forall \theta_1 \cdots \theta_{k+1}$ s.t $\theta_1 + \cdots \theta_{k+1} = 1$

$\forall x_1 \cdots x_{k+1} \in C$

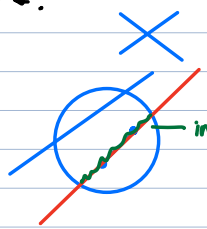
$\theta_1 x_1 + \theta_2 x_2 + \theta_3$

$\sum \theta_i = 1$

$\left(\frac{\theta_1}{\Sigma_k} x_1 + \cdots \frac{\theta_k}{\Sigma_k} x_k \right) \in C$

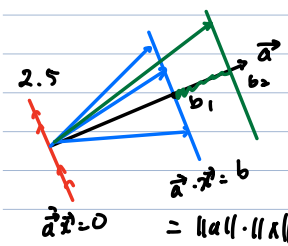
to make $\theta_1 + \cdots + \theta_k$ to 1.

2.2



intersection will be always be in the convex

2.5



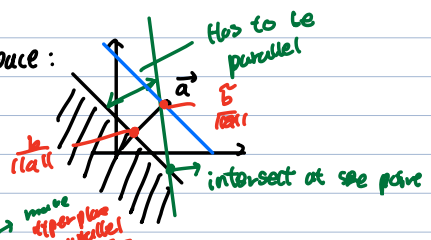
$= \|a\| \cdot \|x\| \cdot \cos\theta$

projection

$\vec{a} \cdot \|a\| = 1$ $\quad \frac{|b_1 - b_2|}{\|a\|}$

2.6

Half space :



① $a = k \cdot \vec{b}$ move hyperplane parallel $k > 0$

② $\frac{\vec{b}}{\|a\|} = \frac{b}{\|a\|}$