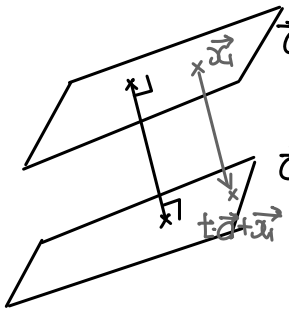
2.5 What is the distance between two parallel hyperplanes $\{x \in \mathbf{R}^n \mid a^T x = b_1\}$ and $\{x \in \mathbf{R}^n \mid a^T x = b_2\}$?



$\vec{a}^T\vec{x}-b_1=0.$ (assume $\|\vec{a}\|=1$)

$\vec{a}^T\vec{x}-b_2=0.$

$\therefore \vec{a}^T\cdot(t\vec{a}+\vec{x_1})-b_2=0.$

$t\cdot\vec{a}^T\cdot\vec{a}+\vec{a}^T\vec{x_1}-b_2 = t(\vec{a}^T\cdot\vec{a})+(b_1-b_2)=0$

$\vec{a}^T\vec{x_1}=b_1$

$\therefore t=\dfrac{|b_1-b_2|}{\vec{a}^T\cdot\vec{a}}$