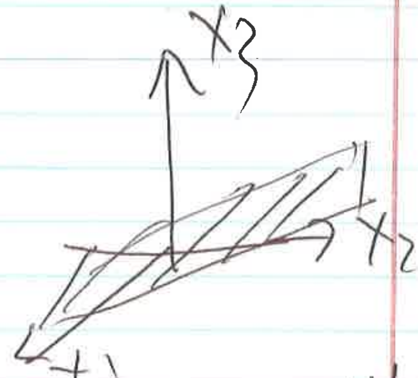
(1) $ax+by+1$ line

plane

$\begin{pmatrix} a_1 \\ a_2 \\ a_3 \end{pmatrix} \cdot \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} + 1 = 0$

$a_1x_1 + a_2x_2 + a_3x_3 + 1 = 0$

$x_3 = 1 - a_1x_1 - a_2x_2$



(2) w is norm.

$wx_1 + b = 0 \quad wx_2 + b = 0$

$w(x_1 - x_2) = 0$

(3) $w = (w_1, w_2, w_3) \quad x = (x_1, x_2, x_3)$

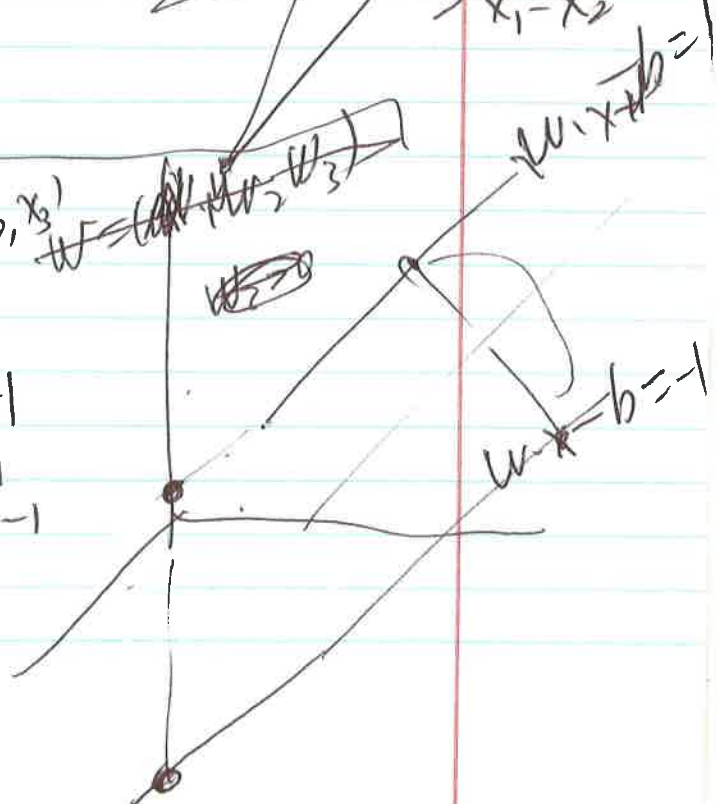
$w_3 >$

$w_3 x_3 - b = 1 \qquad w_3 x_3 = b+1$

$\vee$

$w_3 x_3 - b = -1 \qquad w_3 x_3 = b-1$

let $x_1 = x_2 = 0$

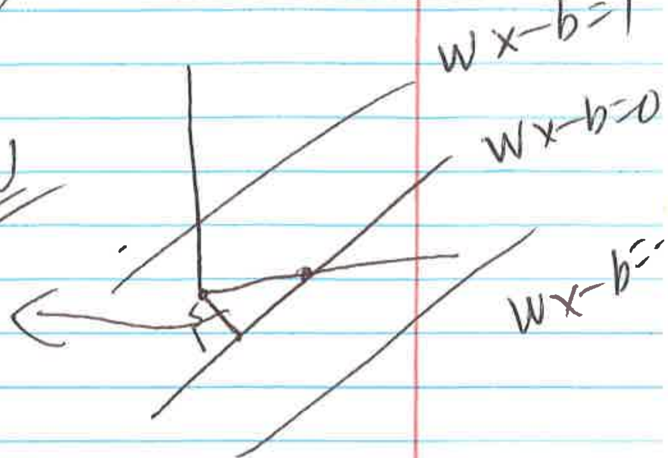


④ $(w^+ - w^-)\cdot\frac{w}{\|w\|}$

$= \frac{w^+ w - w^- w = b-1-(-b-1)}{\|w\|} = \frac{2}{\|w\|}$

$w^+ - w^-$ is $= \alpha \cdot \frac{w}{\|w\|}$ α is the length

⑤ $\frac{b}{\|w\|}$?



must be ~~αα~~ αw

α is parall.

$w\cdot(\alpha w) - b = 0$

$\alpha = \frac{b}{\|w\|^2}$

$\rightarrow \|\alpha w\| = \alpha\|w\| = \frac{b}{\|w\|^2}\cdot\|w\| = \frac{b}{\|w\|}$

b is to deter the positi line.