Linear classifier is $w = [w_1, w_2, w_3, w_4]$ and τ (these are the params. of the linear classifier / model).

Given an example / f.v. $x = [x_1, x_2, x_3, x_4]$, the model (w, τ) predicts a label $\hat{y}$ or $\hat{y}(x)$ computed as follows:

Test time / Inference time / Prediction time

if $w^T x \geq \tau \Rightarrow \hat{y}(x) = +1$

else $\hat{y}(x) = -1$.

during training, we want $\hat{y}$ to match y (predicted label, true label)

we want $\hat{y}(x) = y(x)$

for each training example x_i, want $\hat{y}(x_i) = y(x_i)$

$\hat{y}_i = y_i$

Given height and weight, train a model $w = [w_1, w_2]$ and t such

(x_1 = height, x_2 = weight)

that $w^T x \geq t$ iff x is good at basketball.

$$w_1 x_1 + w_2 x_2$$

The trained model is $w = [2.5, -0.2]$ and $t = \ldots$

$$x = [6.2, 100]$$

$$w^T x = \frac{2.5}{w_1} \times 6.2 + 100 \cdot -0.2$$

increase the height to 7.0 in $x' = [7.0, 100]$

then $w^T x'$ increases to $\frac{2.5}{w_1} \times 7.0 + 100 \cdot -0.2$

which is $2.5 \times 0.8 = 2.0$ larger than $w^T x$

$$w^T x' = w^T x + 2.0$$

positive weight w_1 means increasing $x_1 \Rightarrow$ increase $w_1 x_1 \Rightarrow$ larger $w^T x$.

Basic props. of inequalities:

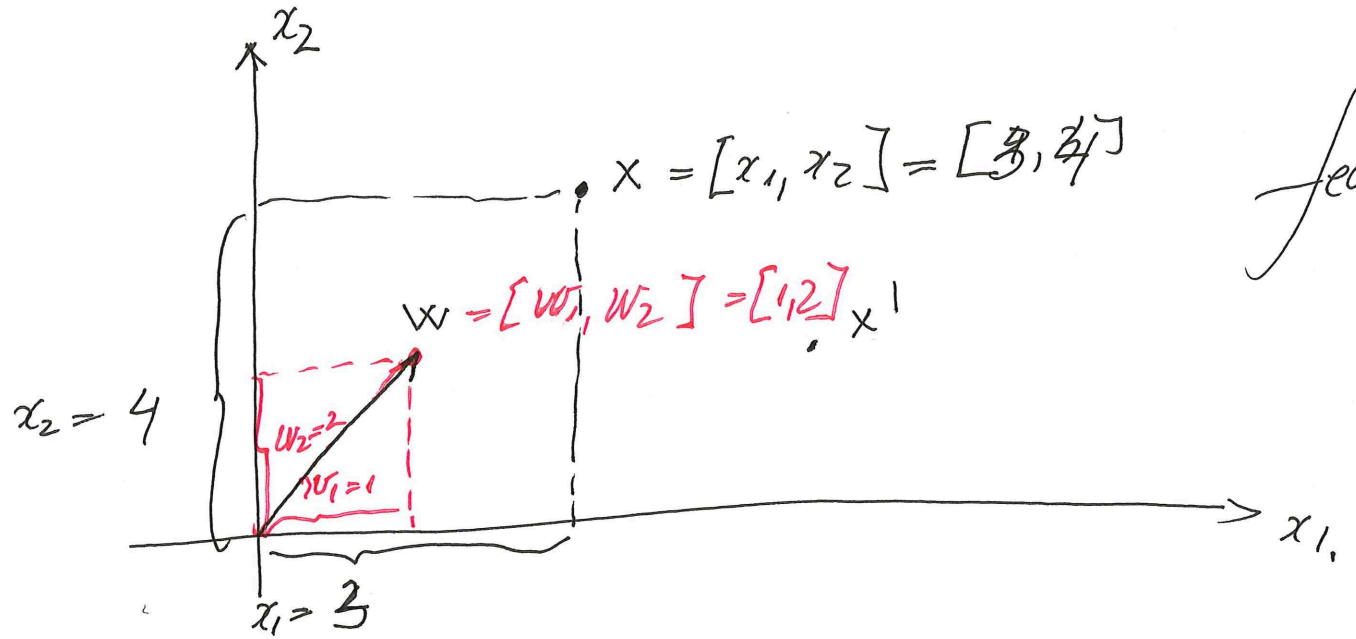
$$a > b \Rightarrow a - c > b - c$$
$$a + c > b + c$$

$$\left.\begin{array}{l} a > b \\ c > 0 \end{array}\right\} \Rightarrow a \cdot c > b \cdot c$$

$$\left.\begin{array}{l} a > b \\ c < 0 \end{array}\right\} \Rightarrow ac < bc$$

$2 > 1 \quad | \cdot (-3)$

$-6 < -3$



feature space.