in binary classification, y is either 0 or 1 and yhat is either 0 or 1

$e = 1-1 = 0,\quad e = 0-0 = 0,\quad e = 1-0 = +1,\quad e = 0-1 = -1$

$e \in \{-1, 0, +1\},\quad e^2 \in \{0, 1\}$

$SSE = \sum e_i^2 = \#\text{errors}$

$\frac{1}{n_*} \sum_{i=1}^{n_*} |e_i| = AAE$

$SST = \sum (y_i - \bar{y})^2 = \left(1 - \frac{3}{27}\right)^2 \cdot 3 + \left(0 - \frac{3}{27}\right)^2 \cdot 24 = 2.67$

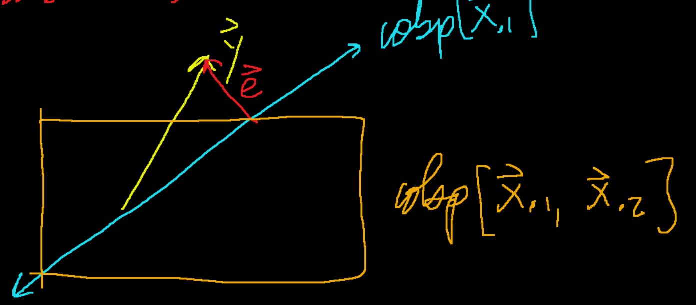
$\bar{y}$: % 1's

$n = 27,\ \#y = 1\text{'s} = 3$

$SST := SSE_0 = \sum (y_i - \overset{0}{g_0})^2 = \sum y_i^2 = n_1 = 3$

$R^2 = 1 - \frac{SSE}{SST} = 1 - \frac{3}{2.67} < 0$

$1 - \frac{SSE}{SSE_0} = 1 - \frac{3}{3} = 0$



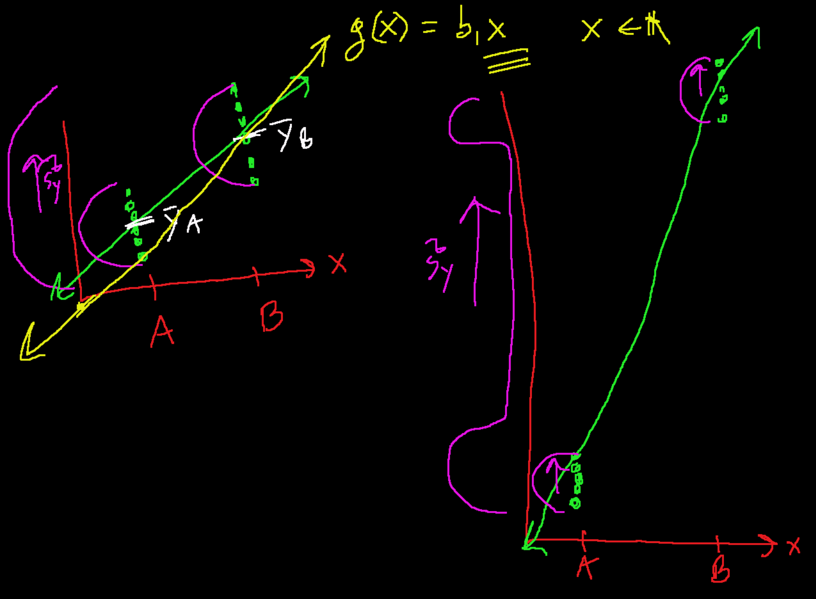
$\sum a_i b_i = \sum b_i a_i$

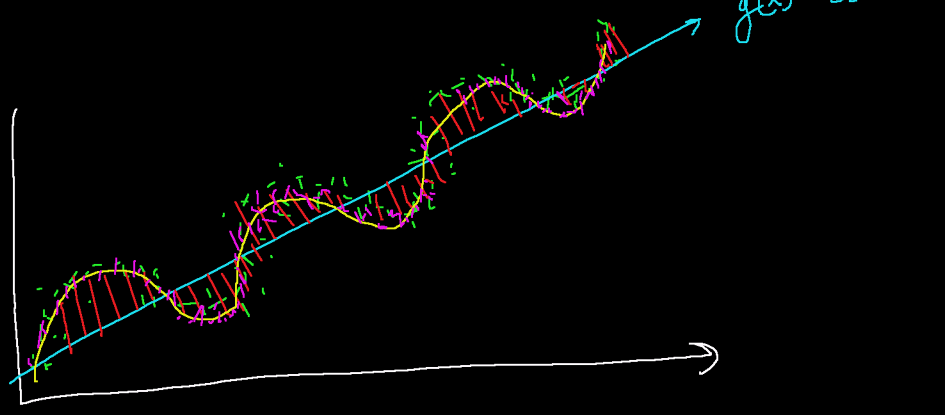
$\Downarrow$

$\vec{a} \cdot \vec{b} = \vec{b} \cdot \vec{a}$

$\Downarrow$

$\vec{a}^T \vec{b} = \vec{b}^T \vec{a}$





$\vec{b} = (X^T X)^{-1} X^T \vec{y}$

$$b_1 = \Bigg(\underbrace{\begin{bmatrix} 0 & 0 & \cdots & 0 & 1 & \cdots & 1 \end{bmatrix}^T \begin{bmatrix} 0 \\ 0 \\ \vdots \\ 0 \\ 1 \\ \vdots \\ 1 \end{bmatrix}}_{n_{x=1}}\Bigg)^{-1} \overbrace{\begin{bmatrix} 0 & 0 & 0 & \cdots & 0 & 1 & \cdots & 1 \end{bmatrix} \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{bmatrix}}^{\sum_{\{i : x_i = 1\}} y_i} = \frac{1}{n_{x=1}} \sum_{\{i : x_i = 1\}} y_i = \bar{y}_1$$

$\frac{1}{n_{x=1}}$

$h^*(x) = \beta_0 + \beta_1 x = [1 \ x]\, \vec{\beta}$

$g(x) = b_0 + b_1 x = [1 \ x]\, \vec{b}$

$n \to \infty \Rightarrow \vec{b} \to \vec{\beta}$