

# Loss Functions

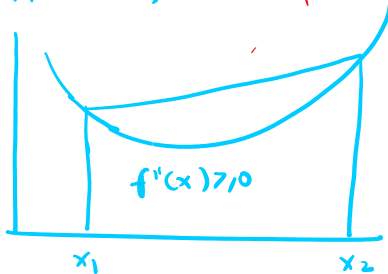
Saturday, October 2, 2021 2:59 PM

Q - What are they??

Q - Where do we use them??

Q - Types of loss function??

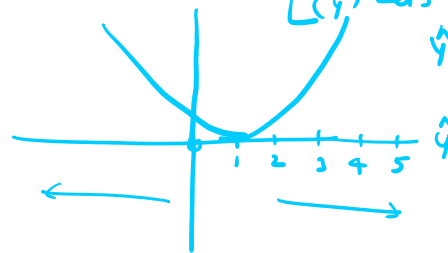
Convex functions  $\Rightarrow$



$$f'(x) < 0$$

for Regression - Loss =  $(y - \hat{y})^2$

$$MSE = \sum_{i=1}^n (y_i - \hat{y}_i)^2$$

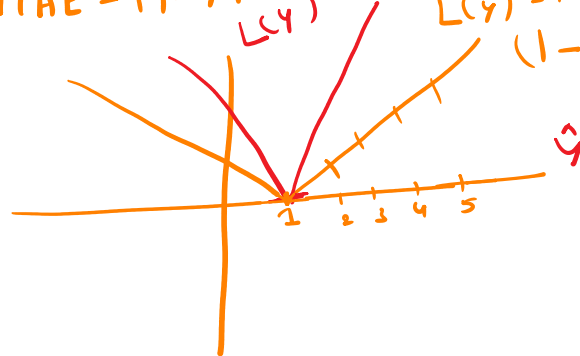


$\rightarrow$  What's the objective??  
(Find Global Minimum)

Let's take  $y=1$   $y = (-\infty, \infty)$   
 $\hat{y}=1$  then  $(1-1)^2 = 0$

Linear Regression

$$MAE = |y - \hat{y}|$$

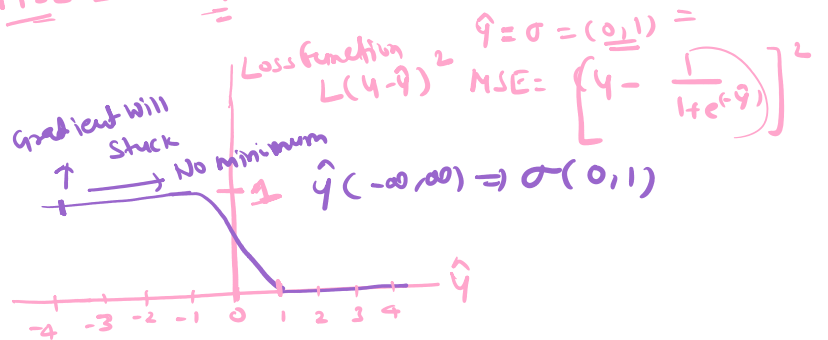


$$L(\hat{y}) = |y - \hat{y}|$$

$y=1$   
 $(1-1)=0$   
 $\hat{y} \neq 1$

Classification Problem  $\Rightarrow \hat{y} \in [0, 1] \rightarrow$

① MSE =  $(y - \hat{y})^2$  Let's take  $y=1$

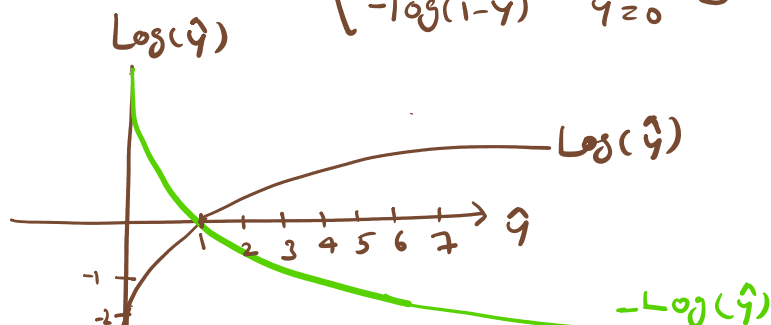


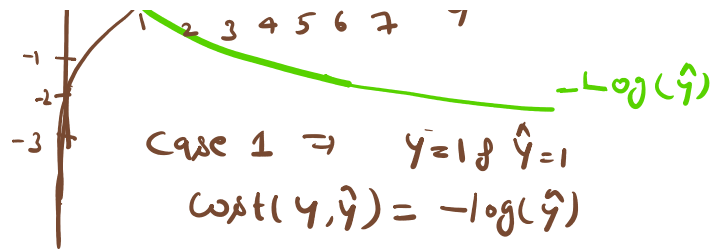
② Cross Entropy function  $\Rightarrow$

predicted Prob-

$$\text{Cost}(y, \hat{y}) = -y \log \hat{y} + (1-y) \log(1-\hat{y})$$

$$= \begin{cases} -\log \hat{y} & y=1 \\ -\log(1-\hat{y}) & y=0 \end{cases}$$

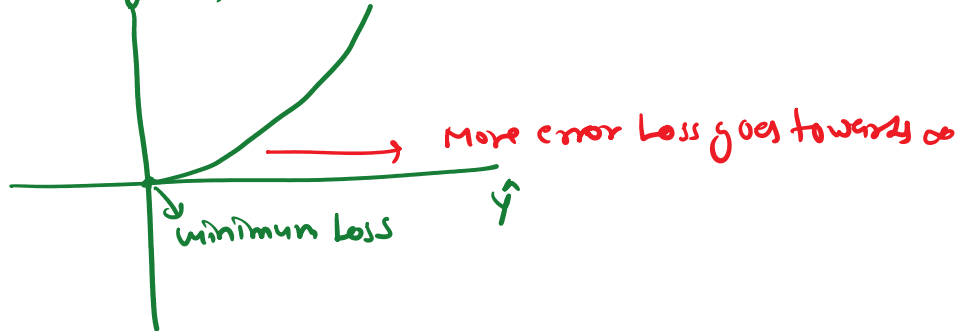




$$= -\log(1) = 0 \text{ (minimum loss)}$$

$$\text{Case 2} \Rightarrow y=0, \hat{y}=0$$

$$-\log(1-\hat{y}) \quad \text{Cost}(y, \hat{y}) = -\log(1-\hat{y})$$



<https://towardsdatascience.com/why-not-mse-as-a-loss-function-for-logistic-regression-589816b5e03c>  
<https://towardsdatascience.com/why-using-mean-squared-error-mse-cost-function-for-binary-classification-is-a-bad-idea-933089e90df7>