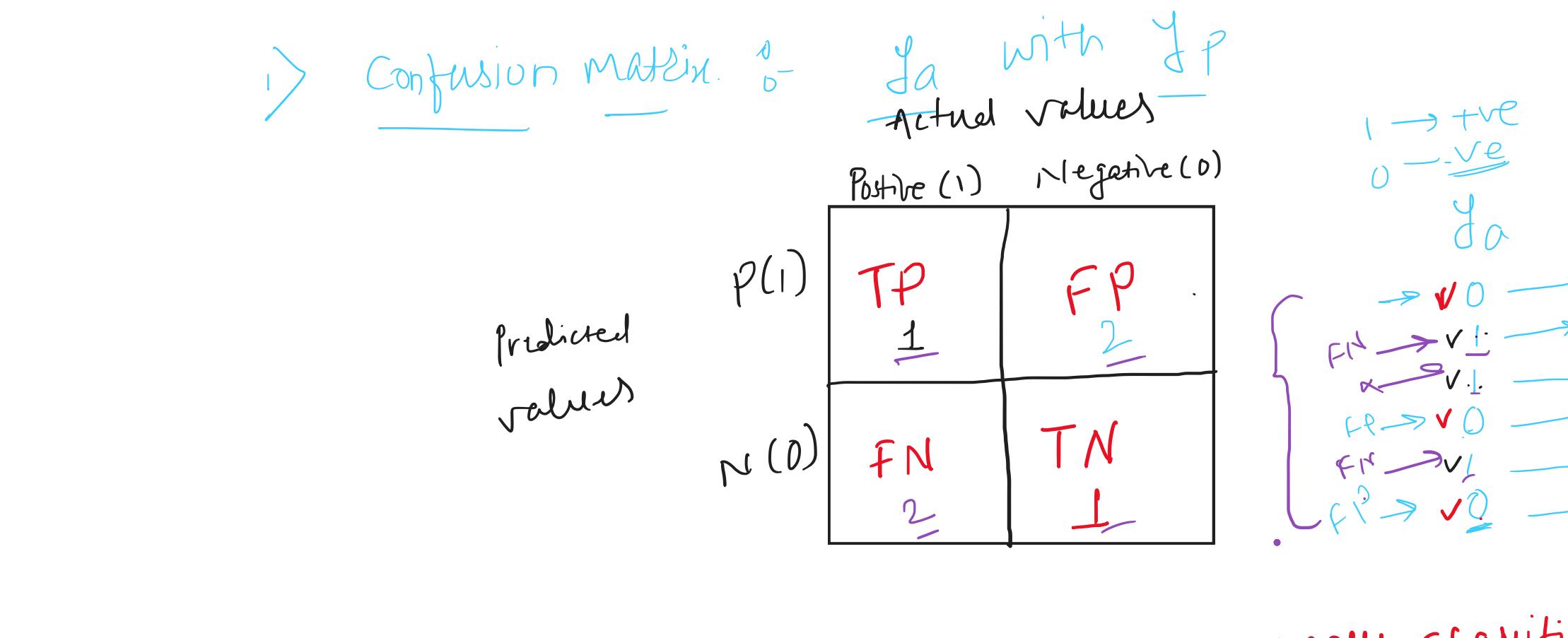
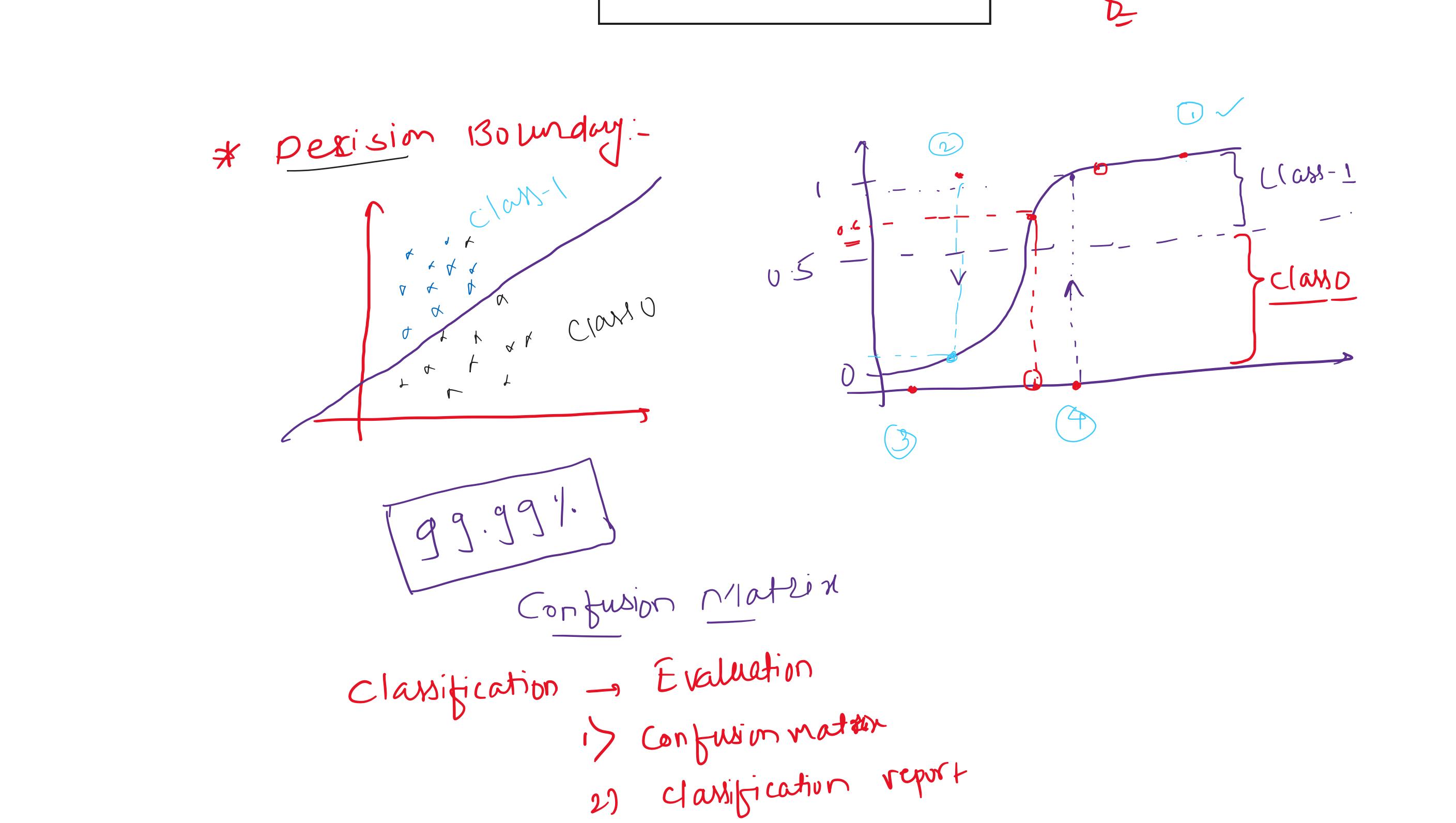


$$\text{Cost fn. of Logistic Reg.} \\ \log\text{-loss} = -\frac{1}{N} \sum_{i=1}^N [y_i \log(p_i) + (1-y_i) \log(1-p_i)]$$

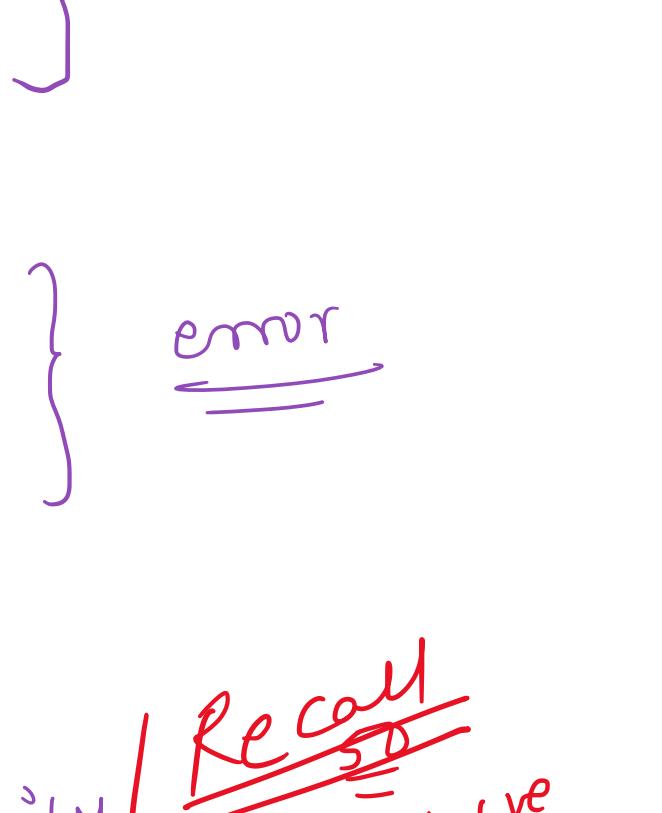
$$\text{Sigmoid Fn.} \rightarrow \text{logistic fn.} \\ P(j) = \frac{1}{1+e^{-x_j}} = \frac{1}{1+e^{-\text{max}(x)}}$$

$(0, 1)$   
is inverse of  $\log\text{-it fn}$



- Classification  $\rightarrow$  Evaluation  
 1) Confusion matrix  
 2) Classification report  
 3) Accuracy score.

		Actual values		
		Positive (1)	Negative (0)	
Predicted values	P(1)	TP	FP	
	N(0)	FN	TN	



- 1)  $TP = \text{True pos} \Rightarrow \text{true class got correctly classified}$   
 2)  $TN = \text{True neg} \Rightarrow \text{neg class got correctly classified}$   
 3)  $FP = \text{False pos} \Rightarrow \text{neg class got wrongly predicted as true}$   
 4)  $FN = \text{False neg} \Rightarrow \text{true class got wrongly pred. as neg}$

Actual true but pred as false

④  $TP \Rightarrow \text{class 1} \rightarrow \text{Class 1}$

$TN \Rightarrow \text{Class 0} \rightarrow \text{Class 0}$

$FP \Rightarrow \text{Class 0} \rightarrow \text{Class 1}$  error

$FN \Rightarrow \text{Class 1} \rightarrow \text{Class 0}$

1)  $TPR = \text{True Positive Rate / Sensitivity}$

$$TPR = \frac{TP}{TP+FN}$$

= Proportion of true classes got correctly classified

2)  $FNR \rightarrow \text{False Neg Rate} = \frac{FN}{TP+FN}$

Proportion of true classes got incorrectly classified

3)  $TNR = \text{True Neg Rate} [\text{specificity}]$

$$TNR = \frac{TN}{TN+FP}$$

Prop. of neg class got correctly classified

$$FPR = \frac{FP}{TN+FP} = 1 - \text{specificity} = 1 - \frac{TN}{TN+FP}$$

Prop. of neg class got incorrectly classified

$$FPR \rightarrow \text{Actual pred.} \\ \text{FP} \rightarrow 0 \rightarrow 1 \\ \text{FN} \rightarrow 1 \rightarrow 0$$

1)  $TP$   $\rightarrow$   $1 \rightarrow 1$  Type I error

0)  $FN$   $\rightarrow$   $0 \rightarrow 0$  Type II error

$$\text{Accuracy} = \frac{TP+TN}{TP+TN+FP+FN}$$

6  $\rightarrow$  3  $\rightarrow$  L

Precision =  $\frac{TP}{TP+FP}$

out of total predicted true results

How many are actual true

= Always try to reduce false

true

email spam filter

④  $TP \rightarrow 1 \rightarrow 1$

$TN \rightarrow 0 \rightarrow 0$

$FP \rightarrow 0 \rightarrow 1$

$FN \rightarrow 1 \rightarrow 0$

Precision =  $\frac{TP}{TP+FP}$ , Recall =  $\frac{TP}{TP+FN}$

10 Formulas

