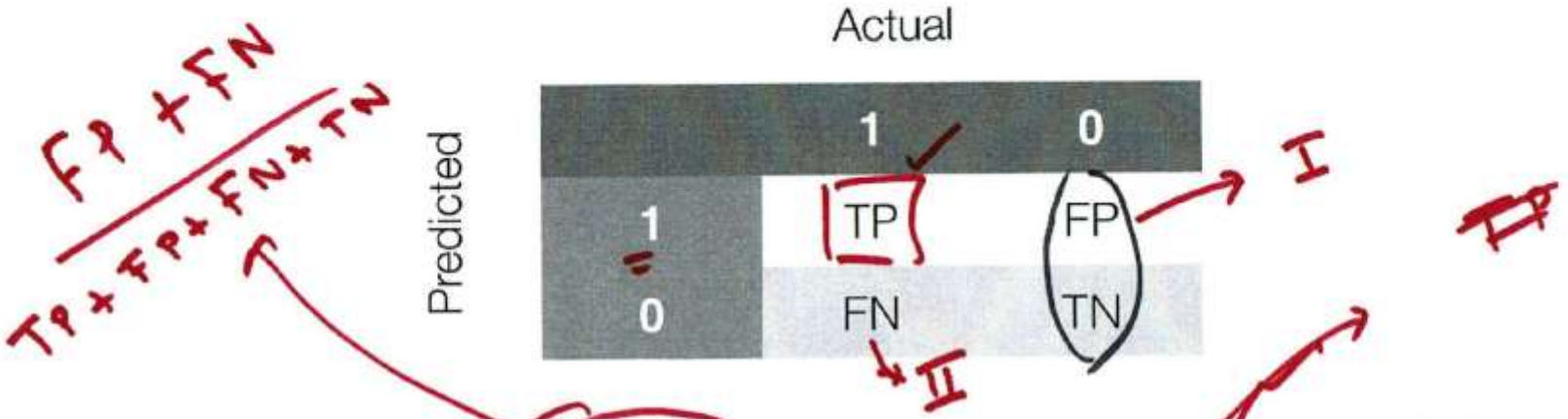
- For classification problem with a class output, the confusion matrix gives the counts of correct and erroneous predictions:



- Classification Error Rate: sum of Type 1 (FP) and Type 2 (FN) Errors (in percentage). Accuracy is 1-(error rate)
- Sensitivity (also called Recall or True Positive Rate): proportion of Total Positives that were correctly identified
- Specificity (also called True Negative Rate): proportion of Total Negatives that were correctly identified

		Truth	
		P	N
Predicted	P	**TP**	**FP** (Type 1)
	N	**FN** (Type 2)	**TN**

Accuracy = TP + TN / TP + TN + FP + FN

		Truth	
		P	N
Predicted	P	0	0
	N	10	$10^9 - 10$

Out of 1 Billion People there are 10 terrorists

Accuracy = $10^9 - 10 / 10^9$
= $1 - 10^{-8}$
= 0.99999
or 99.9999%

Recall (Sensitivity or TPR)

- Recall = TP / TP + FN
- Recall: Out of all terrorist what fraction did you identify

Precision:

- Precision = TP / TP + FP
- Out of all the predicted terrorists what fraction were really terrorists.

Label all as not a terrorist

	P	N
P	0	0
N	10	10^9 - 10

$$ACC = (10^9 - 10)/(10^9)$$

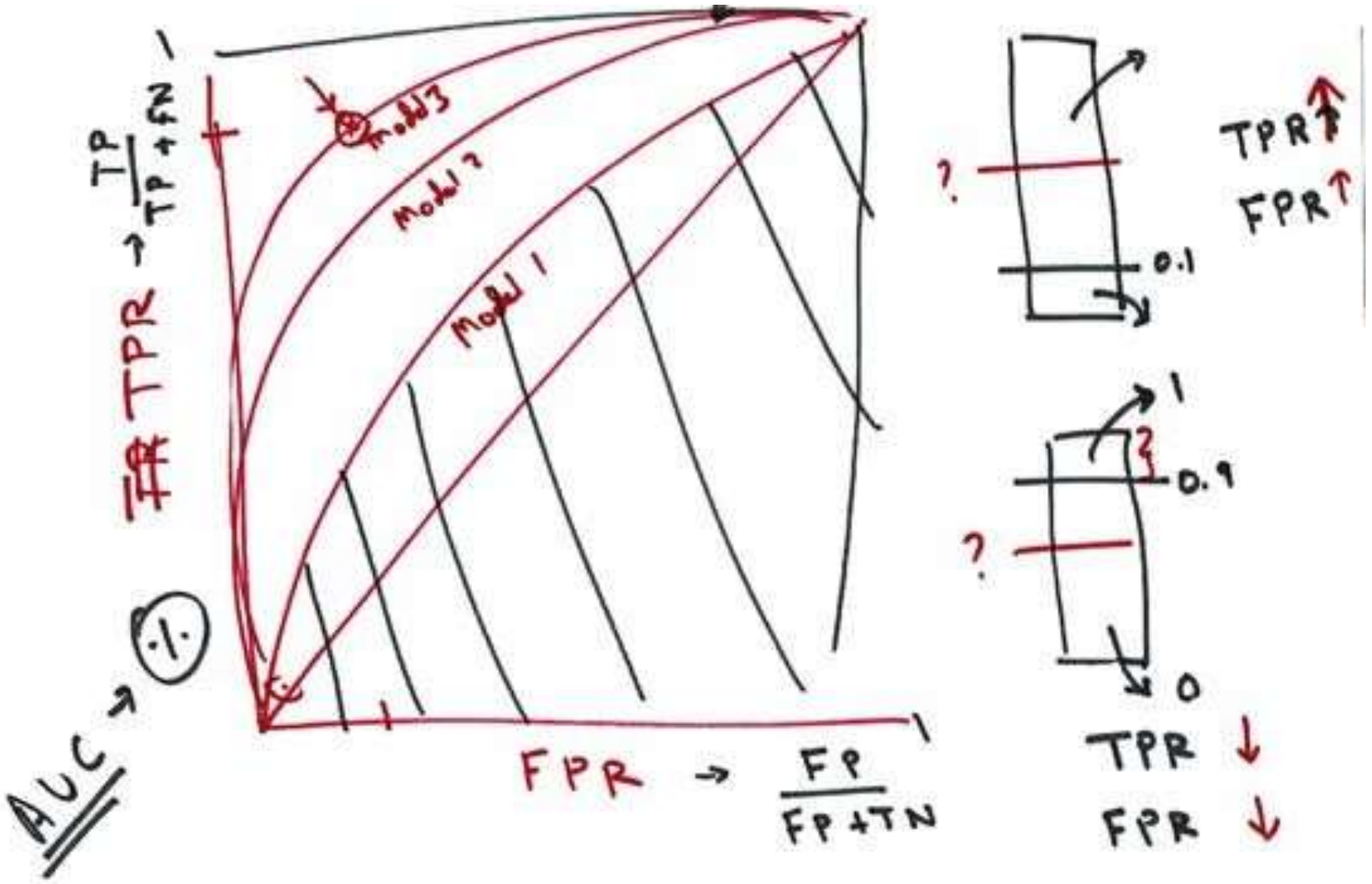
$$= 1\text{-}10^{-8}$$
$$= 0.999$$

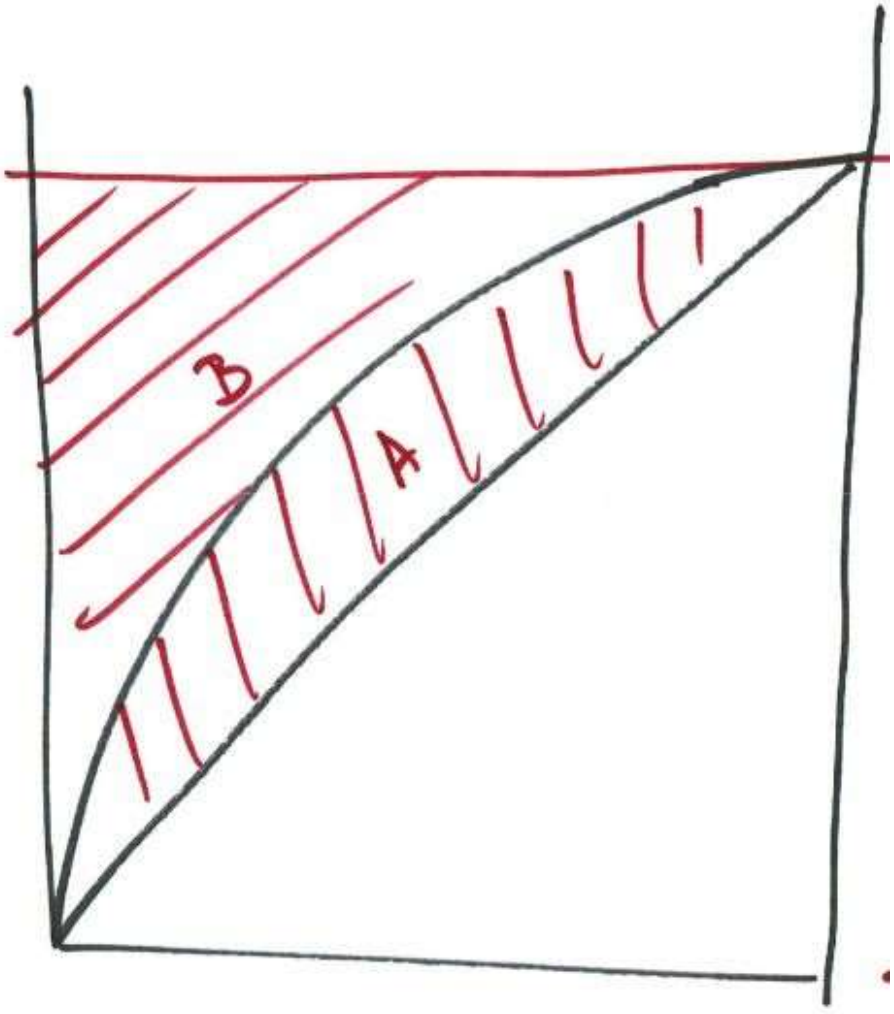
Label all as terrorist

	P	N
P	10	10^9 - 10
N	0	0

	Acc	Recall	Precision
All as not terrorist	1	0	0
All as terrorist		1	low
Predicts the top terrible only		0	1

$$F_1 = (2 * P * R) / (P+R)$$





Gini Coefficient = A / A + B

A = AUC - 0.5

A + B = 0.5

Gini Coefficient = AUC - 0.5 / 0.5

Gini Coefficient = 2 * AUC - 1