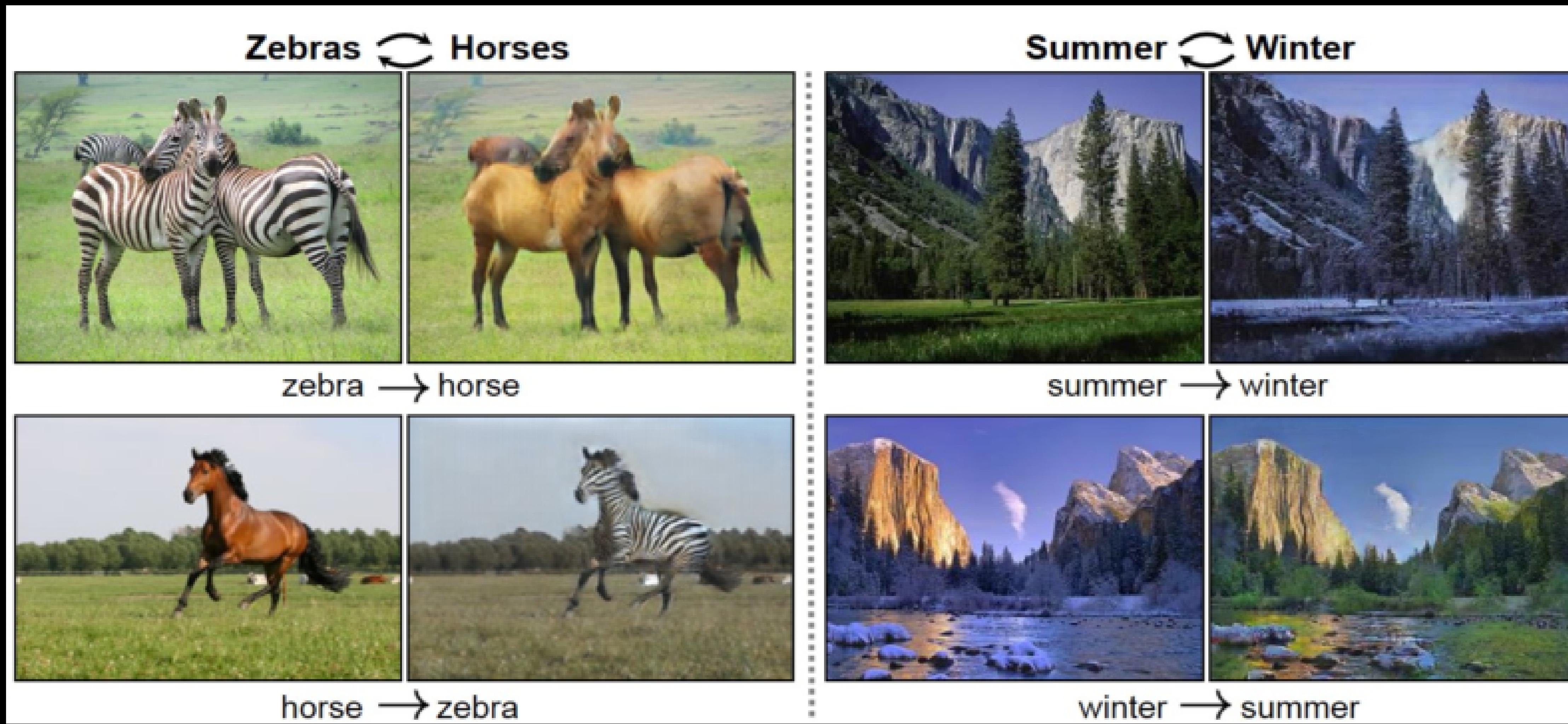
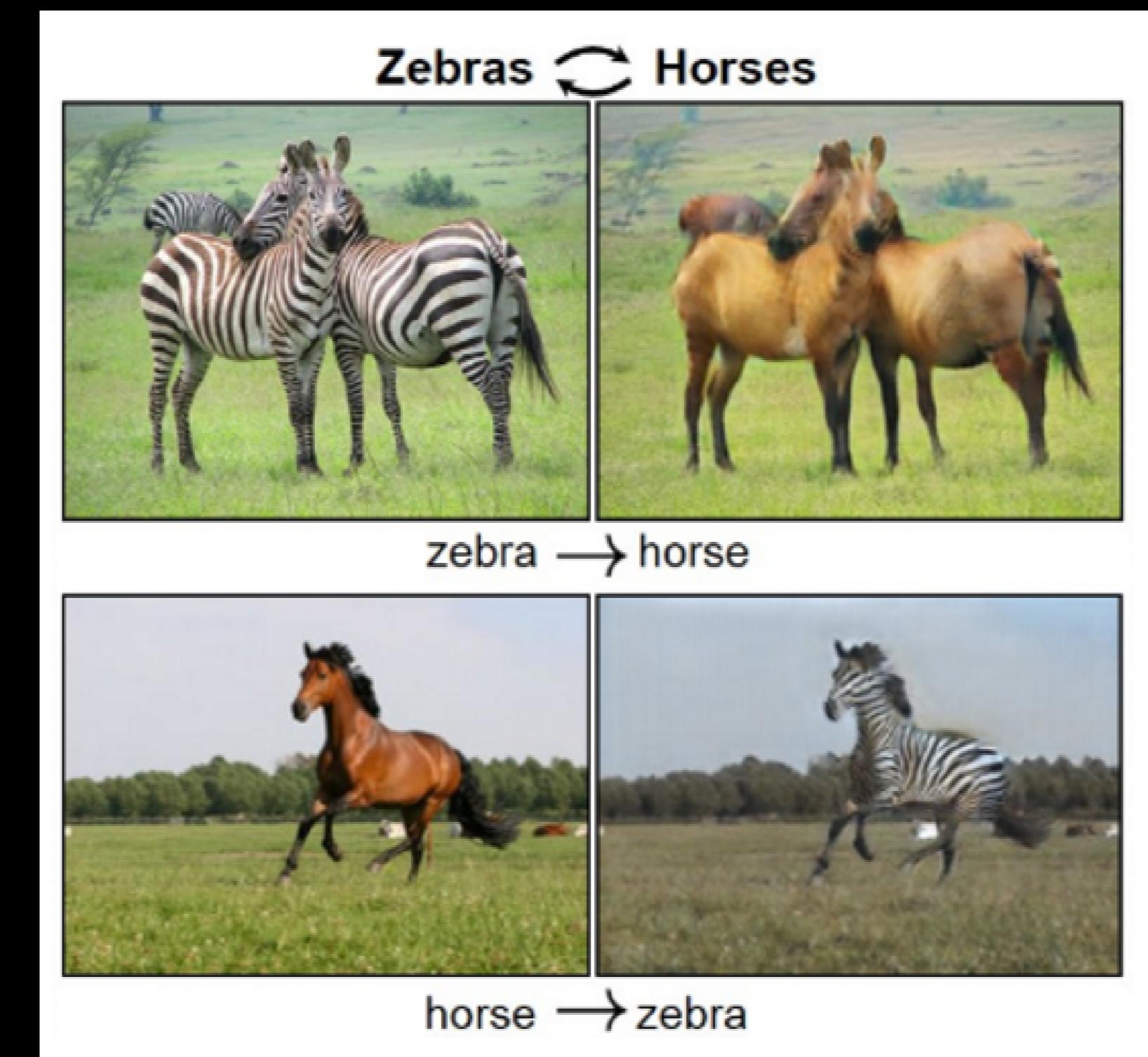


Generative VS
Discriminative ?
Models

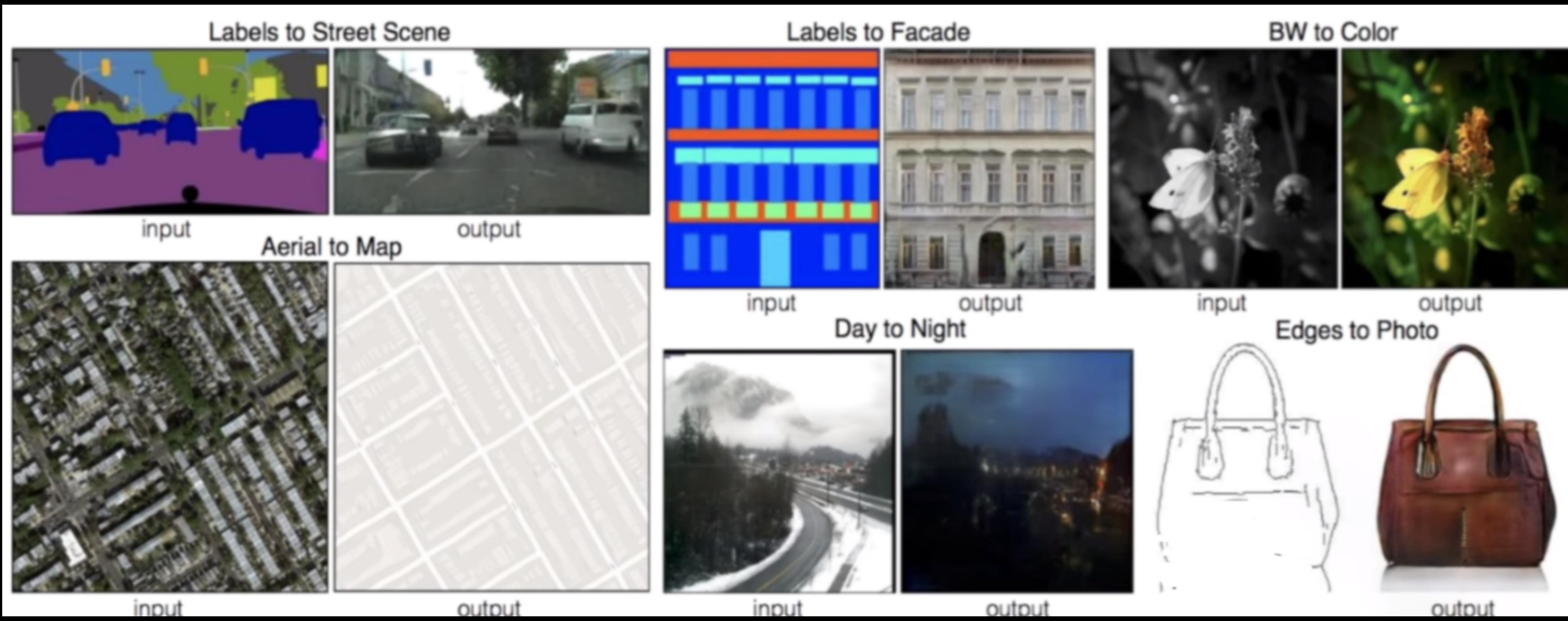
fake
↓



generate
new
data → images,
text,
speech

GAN
Generative
Adversarial
Networks

ian goodfellow
2014



Generative

- HMM
- GAN

$$P(X, Y)$$

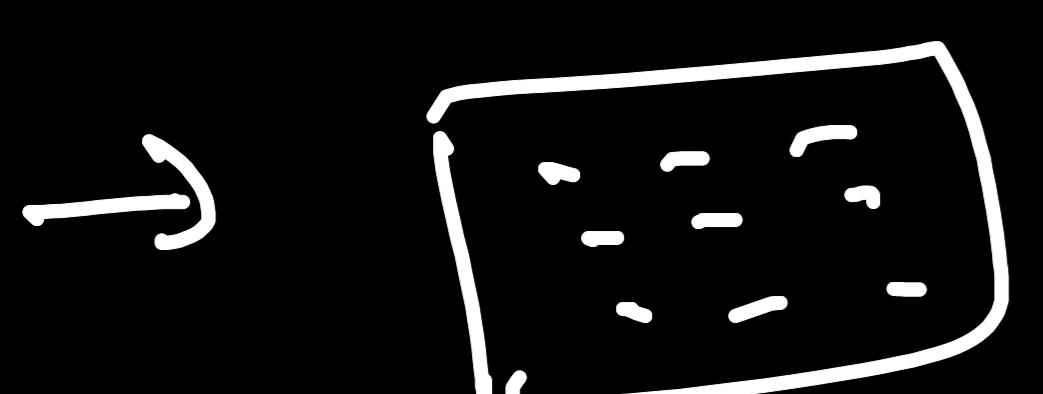
↑

Get X from Y

Joint Prob.

$$P(X, Y) = P(X|Y) P(Y)$$

Prob of X given Y .



generate some
spam 'text'

$$P(X|Y)$$

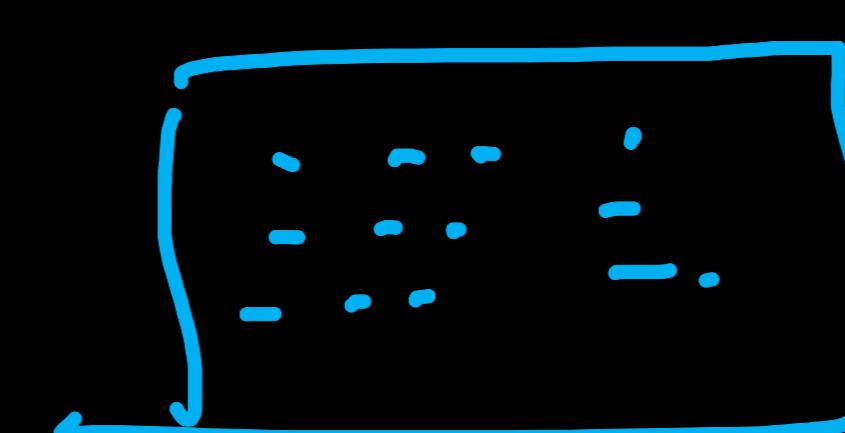
Discriminative

- [Logistic
- [SVM
- [Neural Networks

$$P(Y|X)$$



$$P(Y|X)$$

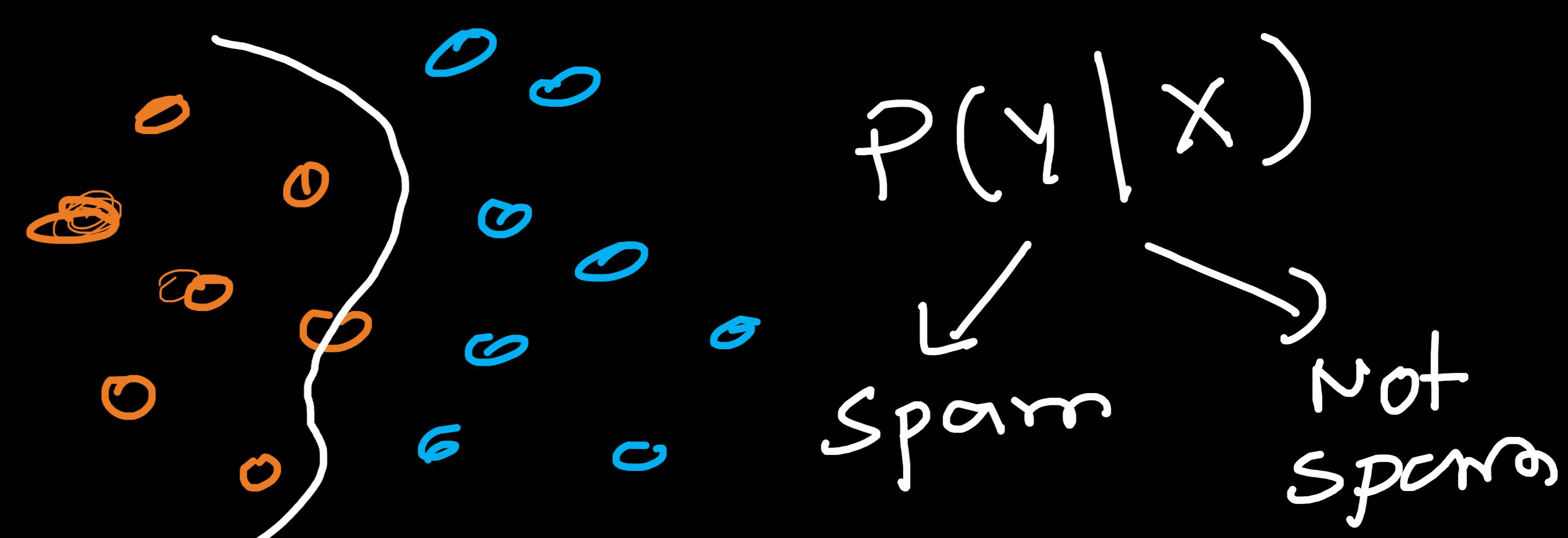


$$P(Y = \text{spam} | X)$$

SMS

Predicting Y from X .

→ Create a Dog Image
how to get X from Y .



$$P(X, Y)$$

X is an image
and it is

a dog image

Few points

Mathematical Level

$$\begin{matrix} & X \downarrow & Y \downarrow \\ \downarrow & (1, 0) \end{matrix}$$

$$(2, 0), (2, 1)$$

$$(1, 0)$$

Training Data

$$\begin{matrix} x = 2 \\ y = 0 \\ y = 1 \end{matrix}$$

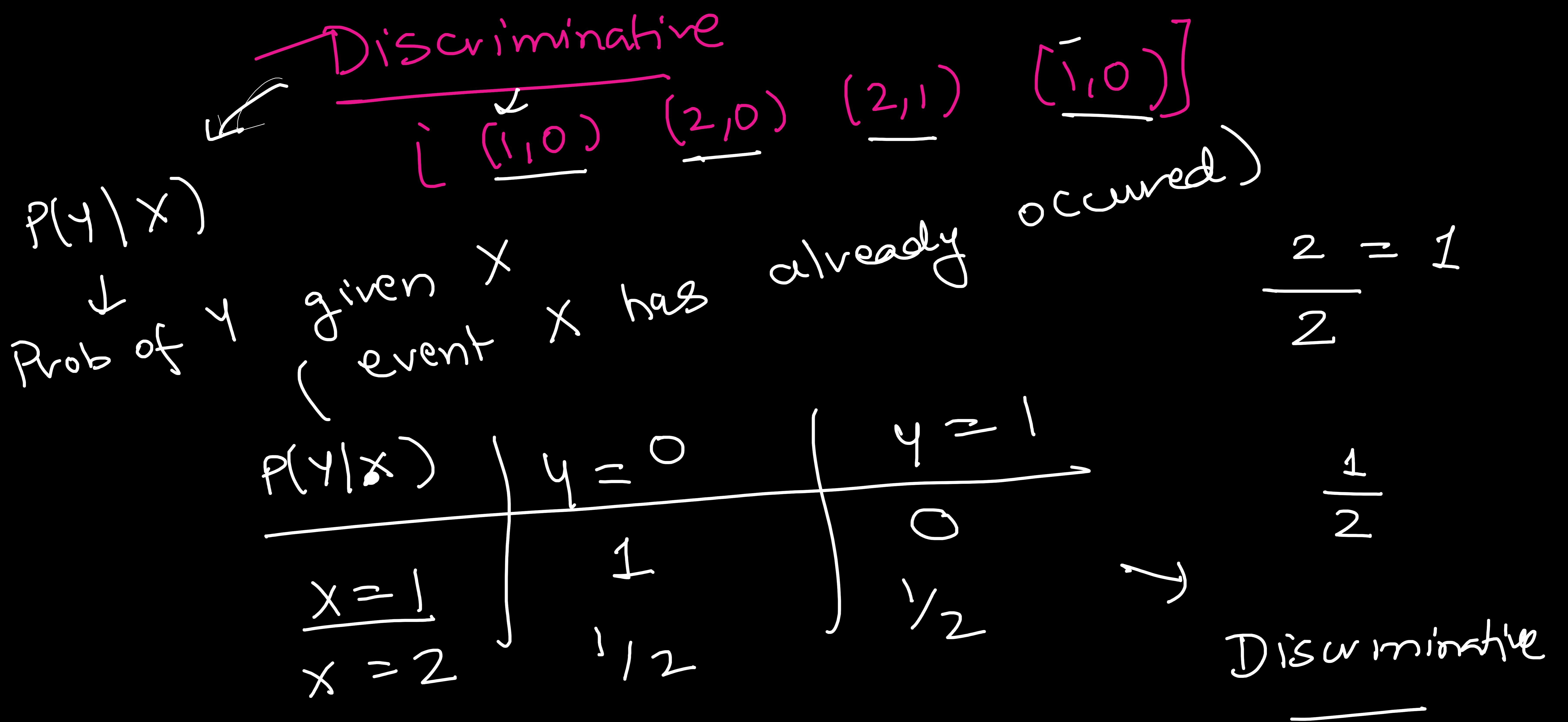
$$2/4$$

Generative model

$$P(x \leq x)$$

		for all x, y	
		$y = 0$	$y = 1$
$x = 1$	y_2	y_3	
	y_4		
$x = 2$			

Prob
↓
generative
model



Generative Adversarial Network

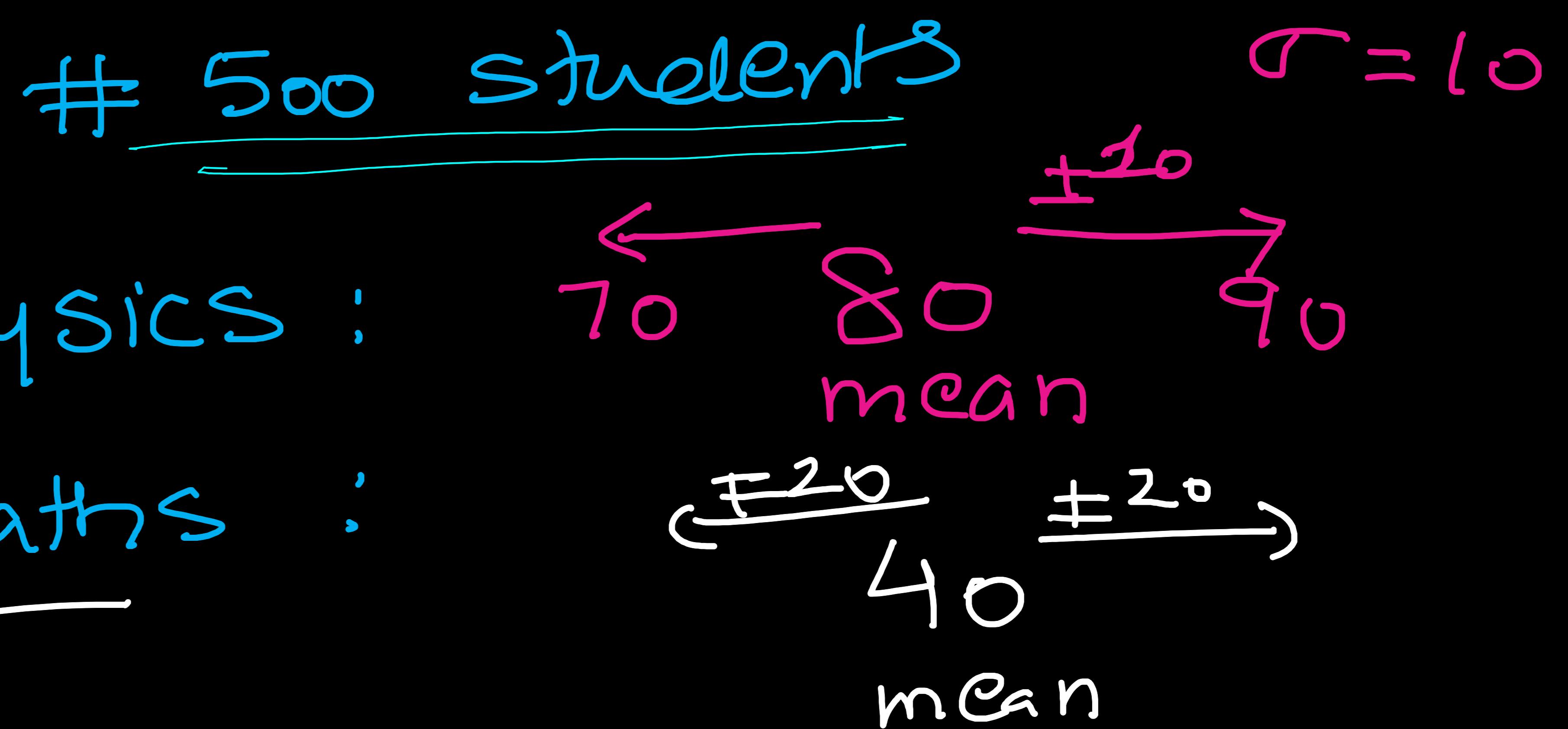
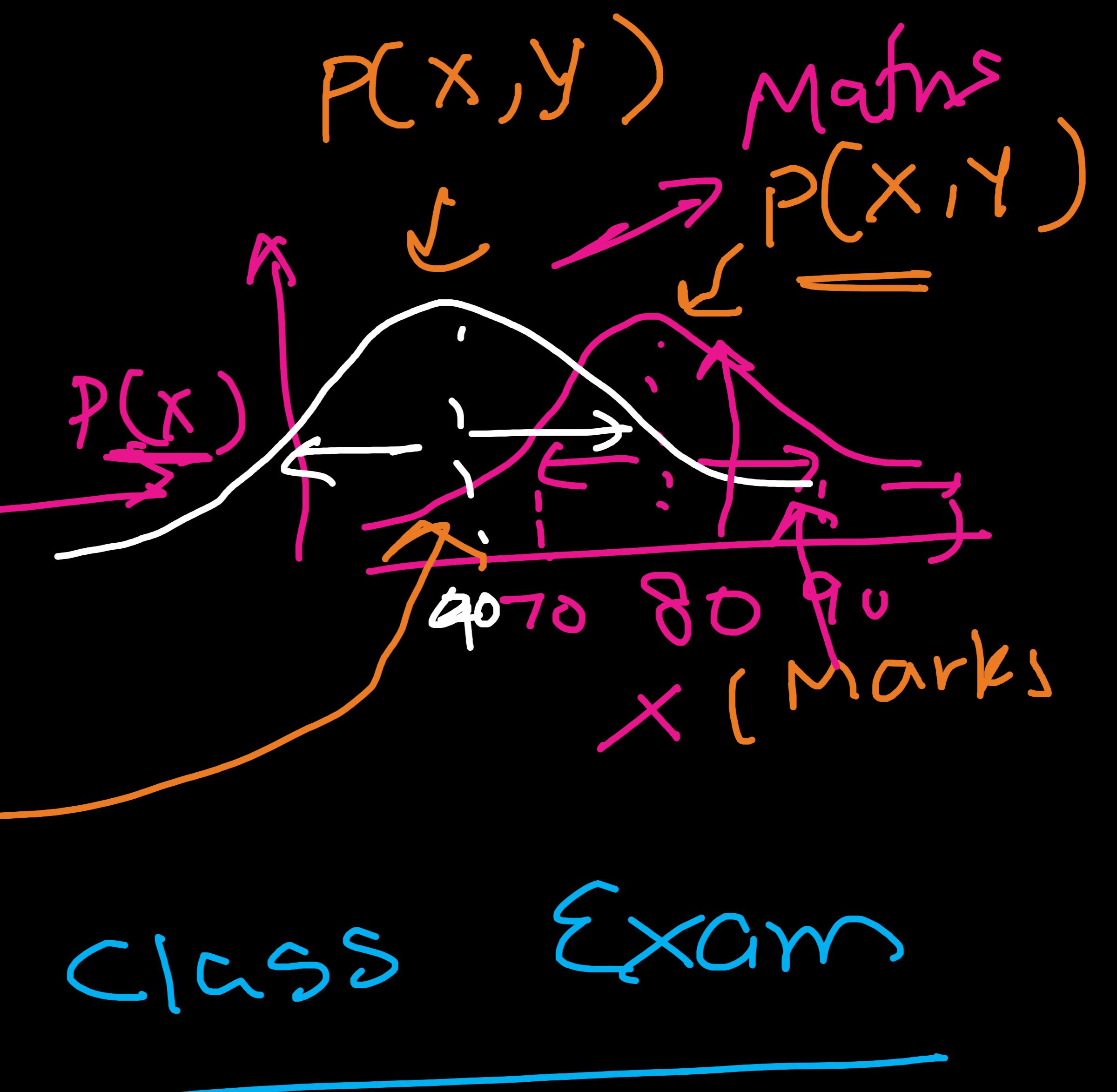
Learn $P(X, Y)$
Joint prob



Goal

500 students
Physics :
 $y=1$ (easy)
 $y=0$ (hard) Maths :

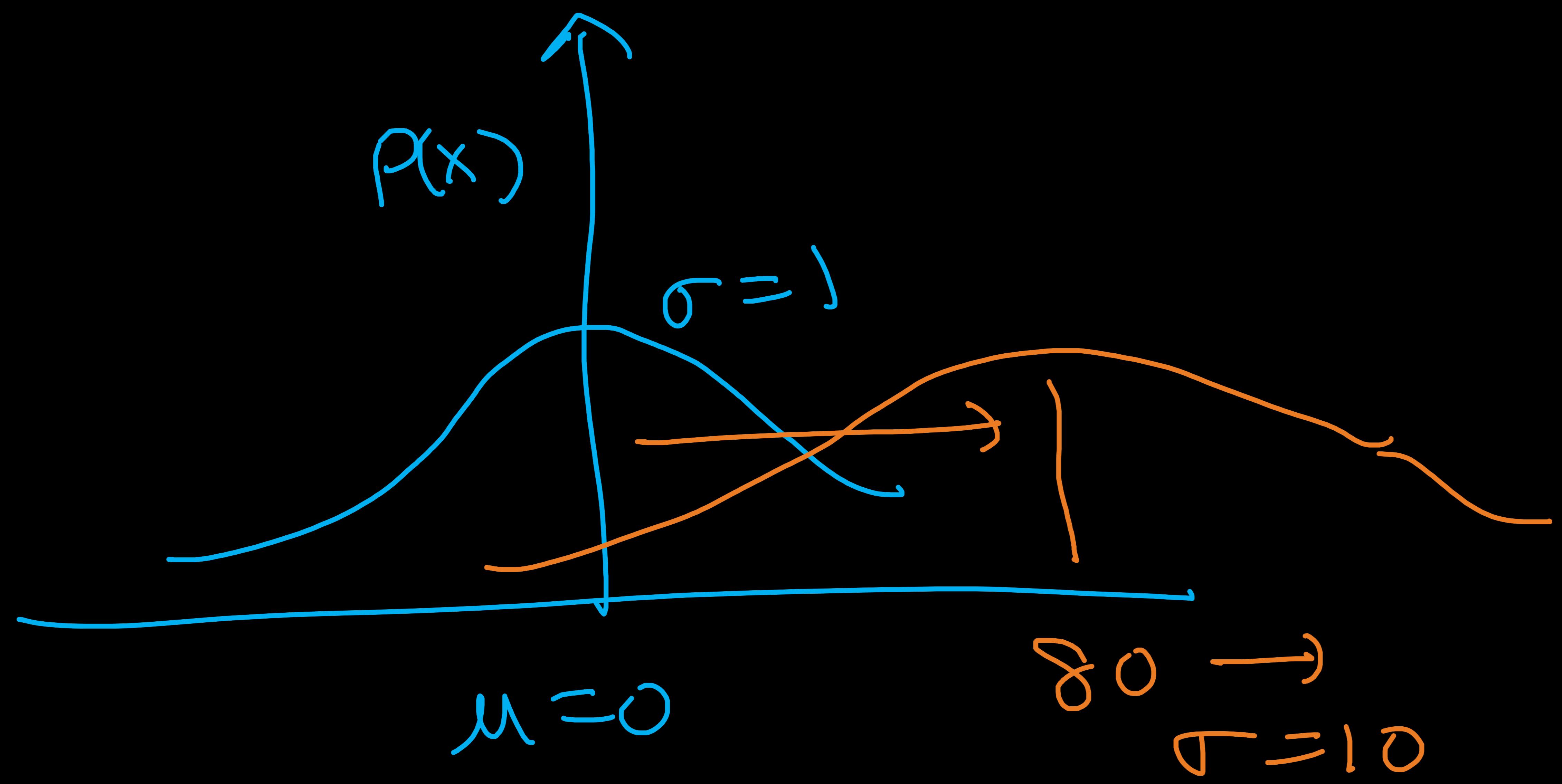
Generating New Data



~~P~~ ~~M~~

Goal
 \equiv
 → Generative
 $P(x, y)$

98 ✓ 35 ✓
 generated



~~new~~

$$x_{SN} = \frac{x - \mu}{\sigma}$$

$x_{Physics} = x_{SN} * \sigma + \mu$

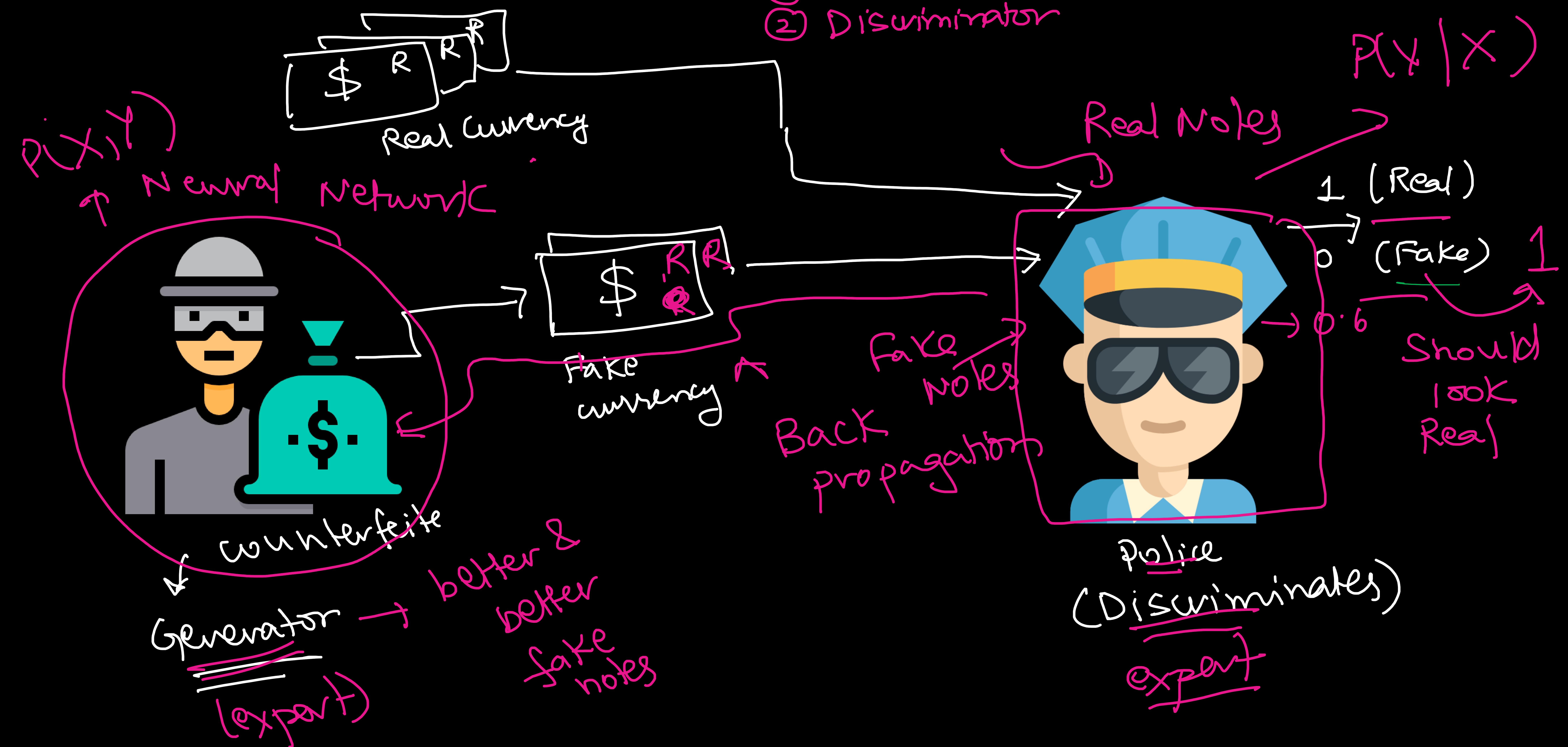
↑
Physics

GAN


- Generates new images
- 2 Network →
 - Generator
 - Discriminator

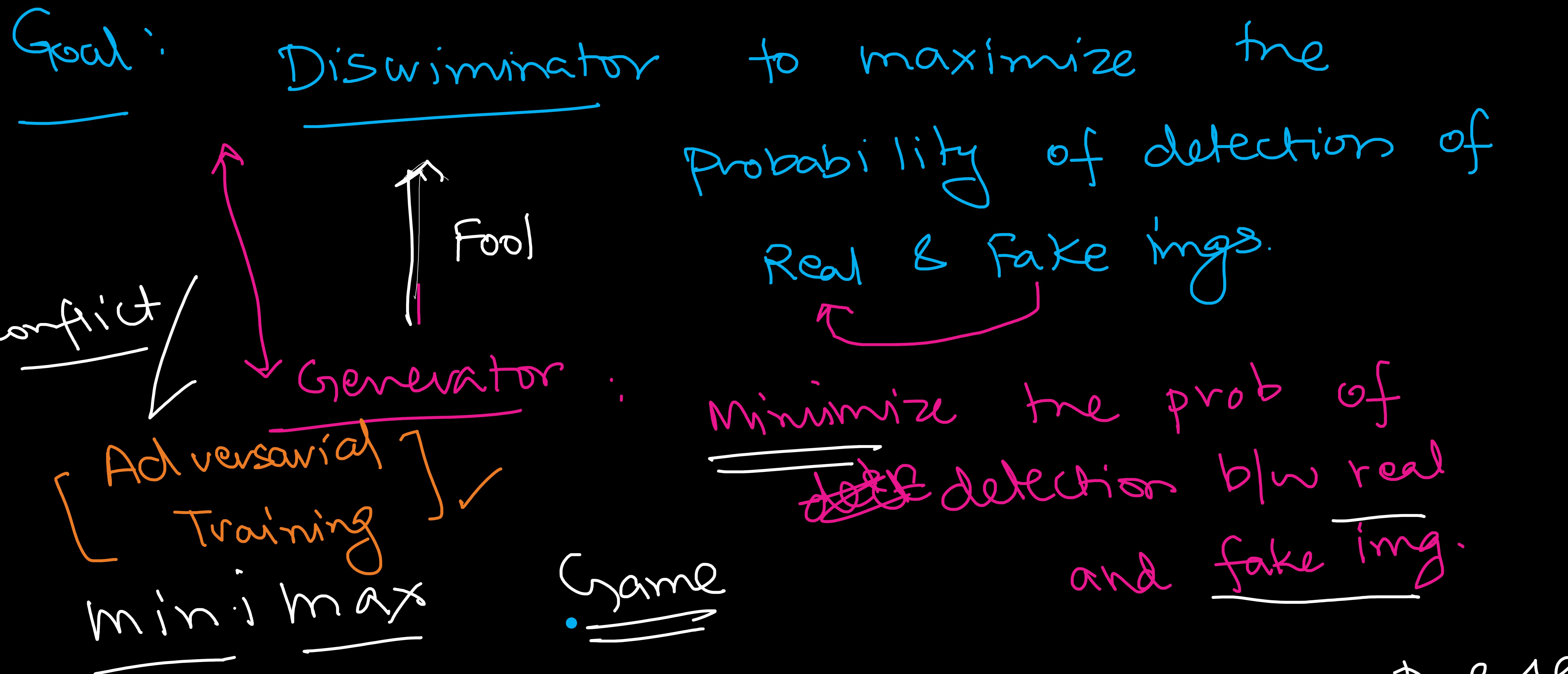
intuitive

$$P(Y | X)$$

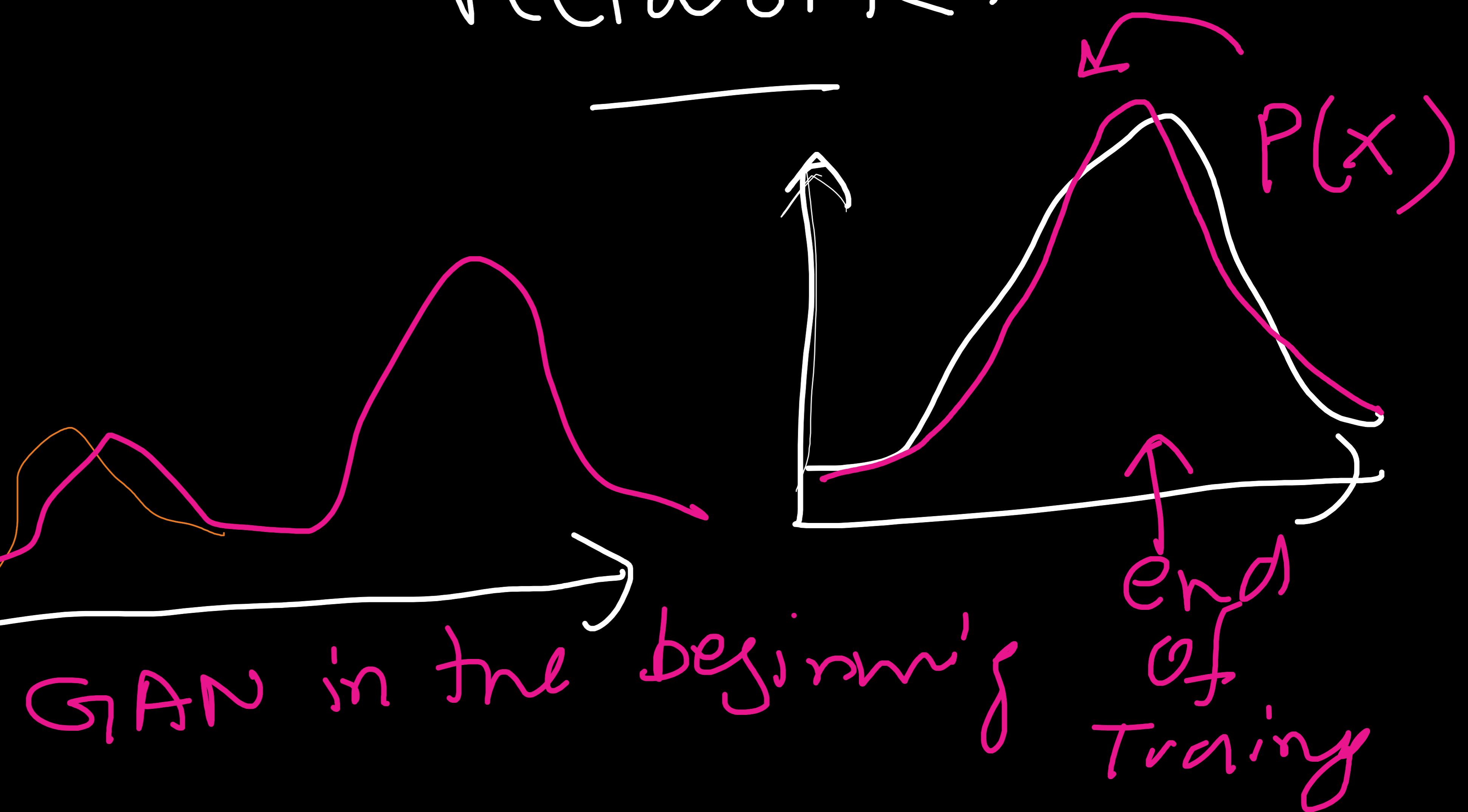
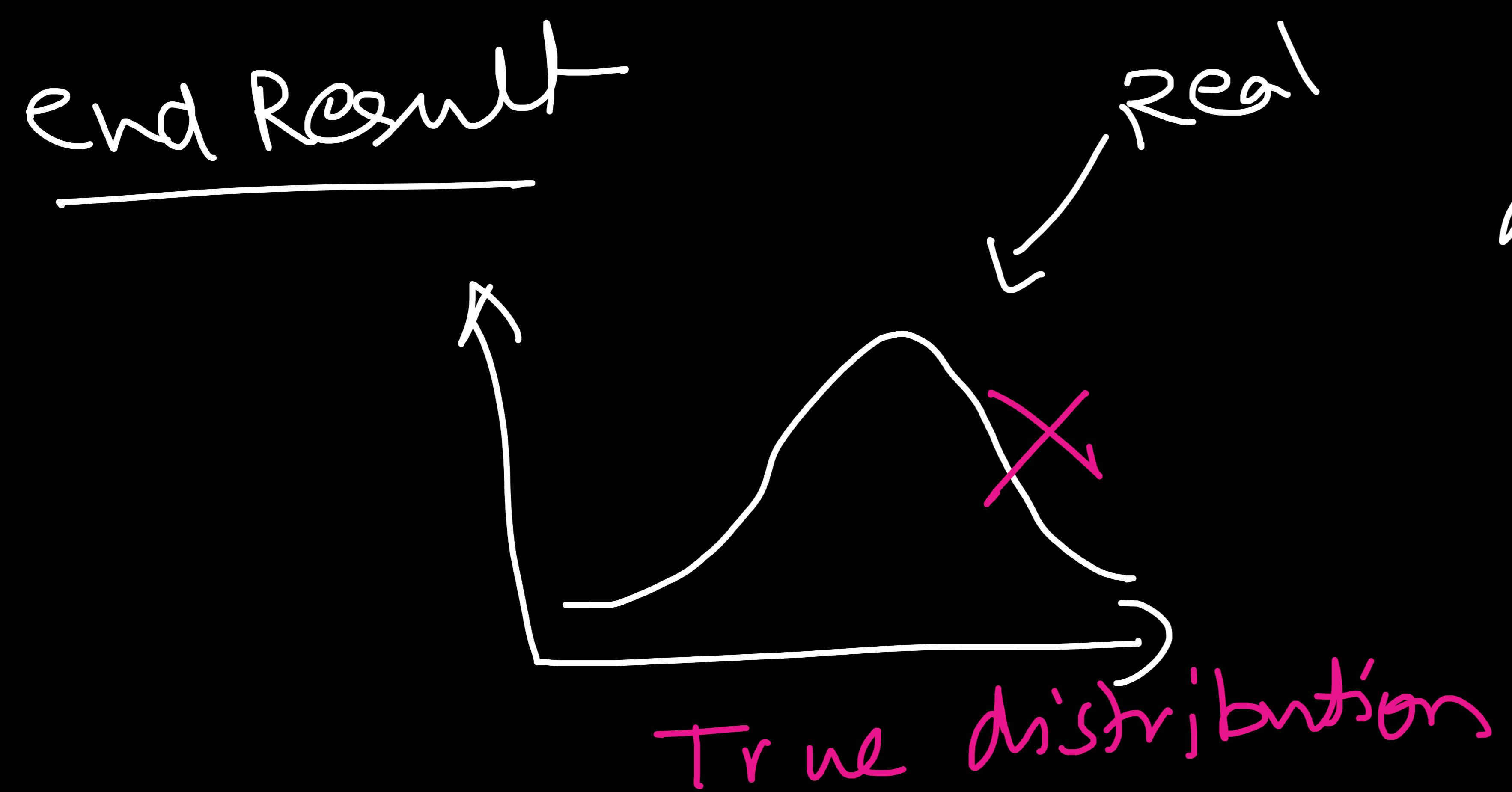



Train GAN (Input & Output)



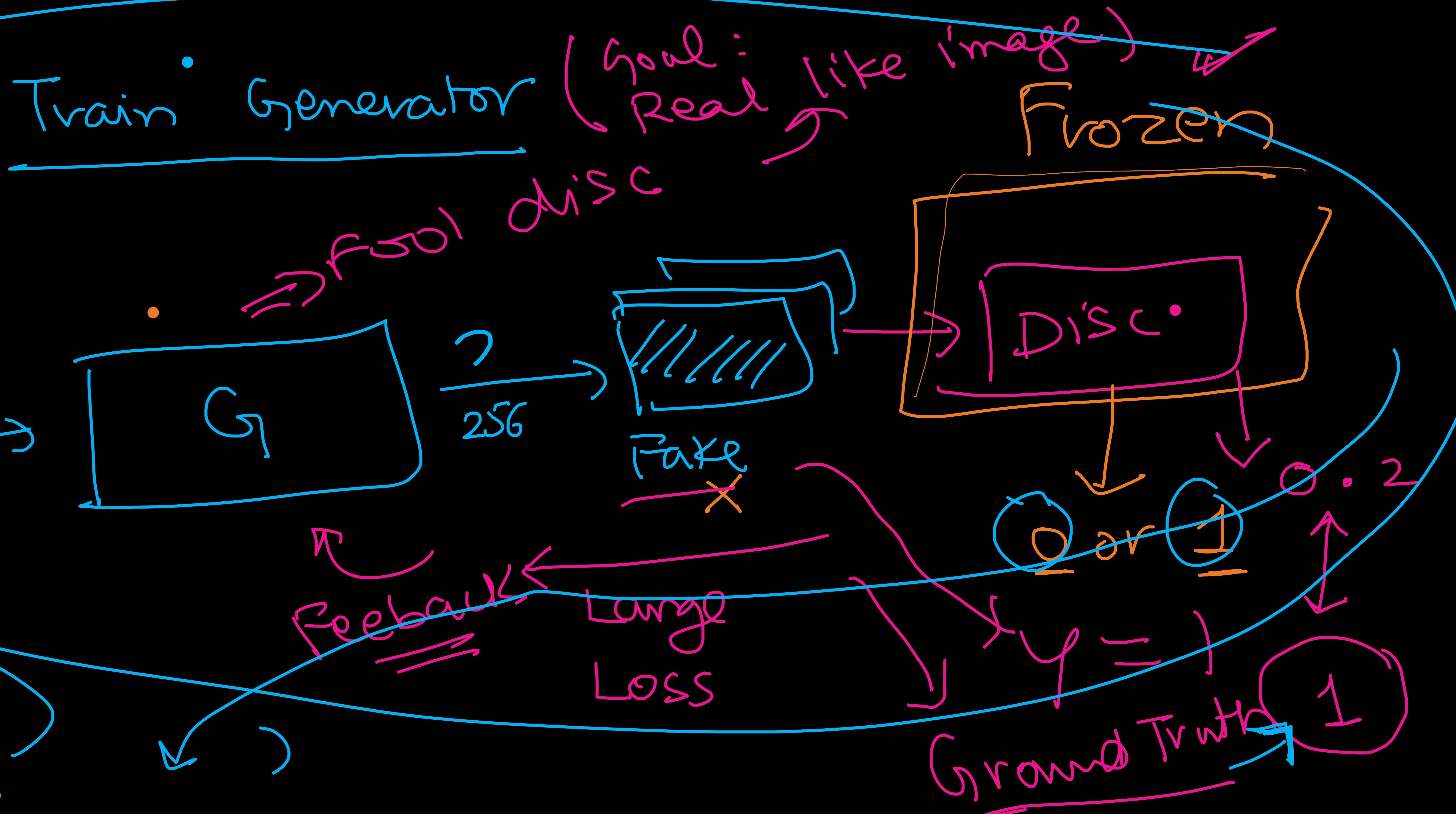


to train the network.





Step-2



GAN's TRICKS

Tips & Tricks

$$(0-1) \rightarrow (-1, 1)$$

MNIST
GAN

