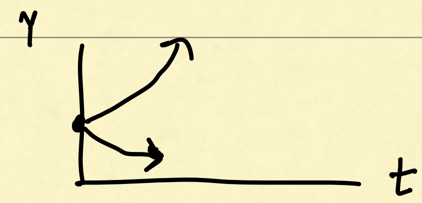
PS6

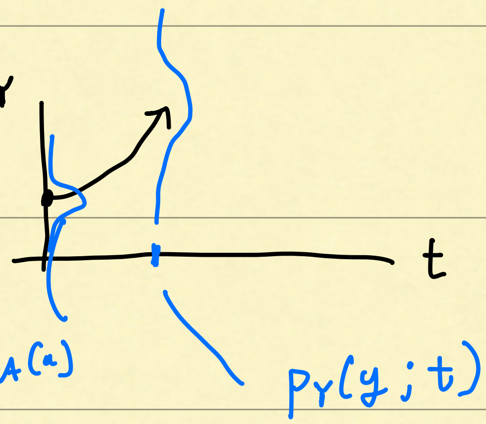
$$\frac{dY}{dt} = RY$$

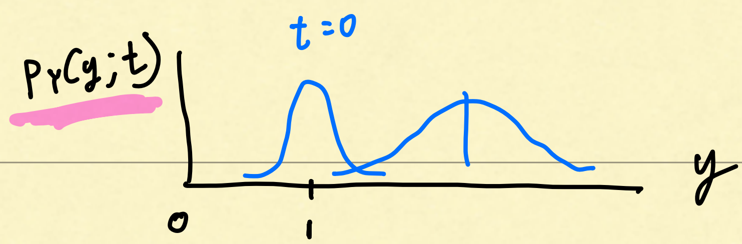


$Y(0) = A$

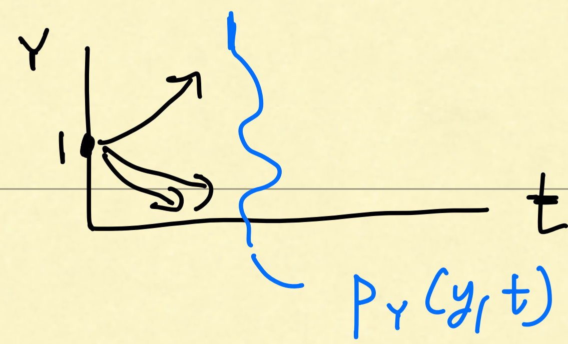
$\boxed{Y(t) = Ae^{Rt}}$

$A \sim p_A(a)$





$R \sim p_R(r)$



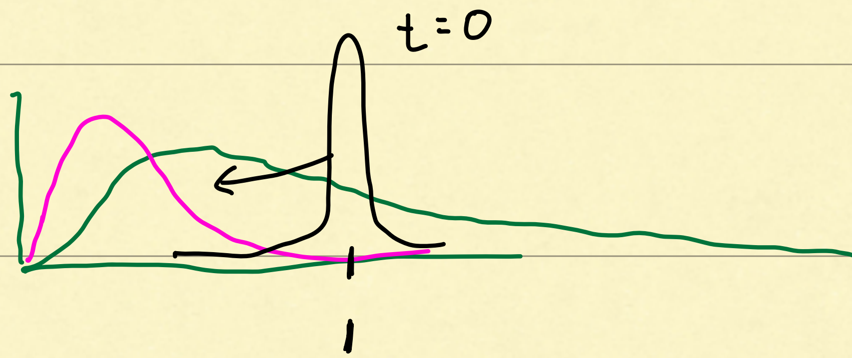
SUPPOSE: $X \sim p_X(x)$

$Y = g(X)$

THEN

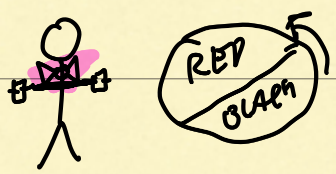
$$p_Y(y) = \underline{p_X(g^{-1}(y)) \left| \frac{dg^{-1}}{dy} \right|} \quad \text{OR} \quad \left| \left(\frac{dg}{dy} \right)^{-1} \right|$$

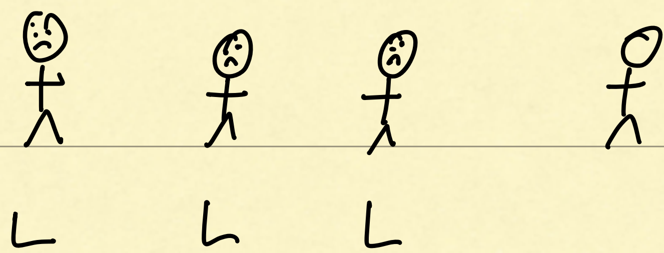
$p_Y(y) =$



PART II

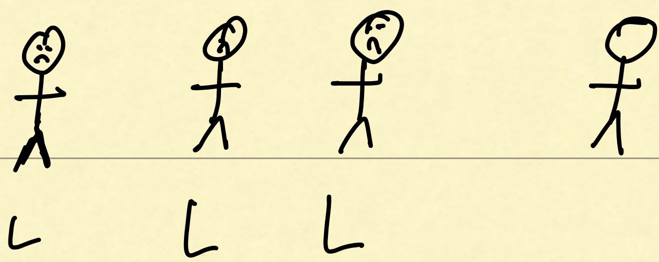
CASINO





$\mathbb{P}(\text{4TH LOSS}) = 0.5$

PROFESSOR



$\mathbb{P}$(4TH LOSS) $= 0.5$

> 0.5

< 0.5 ?

PREDICTION

PROBABILITY

MODEL $\longrightarrow$ OUTCOMES

OBSERVATIONS

STATISTICS

LEARNING / TRAINING

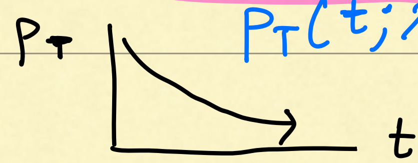
INFERENCE

REGRESSION / CLASSIFICATION

RECALL

PROBABILITY DENSITY EX $p_T(t) = \lambda e^{-\lambda t}$

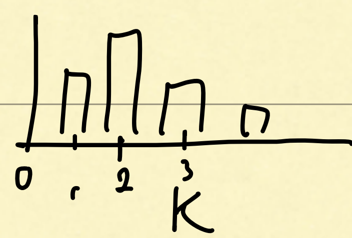
$t > 0$



$p_T(t;\lambda)$

PROBABILITY FUNCTION

$$p_N(k) = \frac{\lambda^k e^{-k}}{k!}$$



$p_N(k;\lambda)$

THE LIKELIHOOD FUNCTION IS THE PROBABILITY DENSITY OR PROBABILITY FUNCTION, VIEWED AS A FUNCTION OF THE PARAMETERS

EX $$L(\lambda) = \lambda e^{-\lambda t}$$

NOTE $$\int L(\lambda)\, d\lambda \neq 1$$

STRATEGY: TO FIND A PARAMETER θ, FROM AN OBSERVATION X, TAKE THE θ THAT MAXIMIZES L.

$\boxed{\text{MAXIMUM LIKELIHOOD}}$