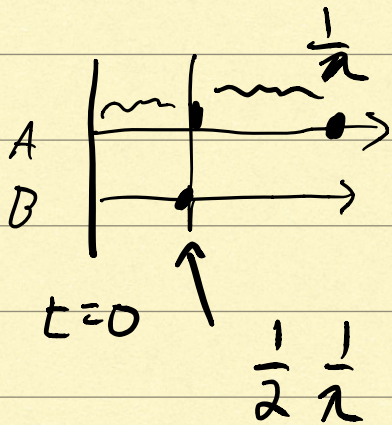


MINI PROBLEM SET

FOR n POISSON PROCESSES,

$$\text{FASTEST } E[T] = \frac{1}{n} \frac{1}{\lambda}$$

$n=2$, SLOWEST $E[T]$?



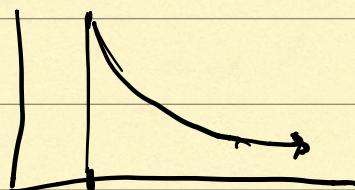
$$\begin{aligned} E[\tau] &= \frac{1}{2} \frac{1}{\lambda} + \frac{1}{\lambda} \\ &= \frac{3}{2} \frac{1}{\lambda} \end{aligned}$$

$n > 2$?

TAILS OF DISTRIBUTIONS

$\alpha > 1$

$$X \sim p_X(x) = \begin{cases} (\alpha-1) \frac{1}{x^\alpha} & x > 1 \\ 0 & \text{ELSE} \end{cases}$$



$$\alpha = 2 \quad p_x = \frac{1}{x^2}$$

$$\int_1^{\infty} p_x(x) dx = 1$$

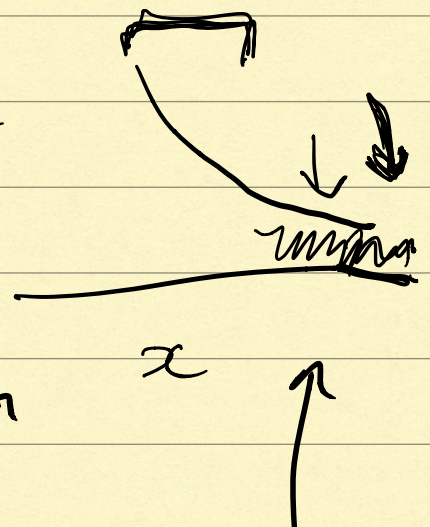
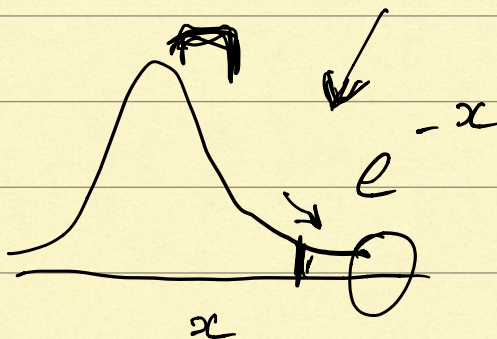
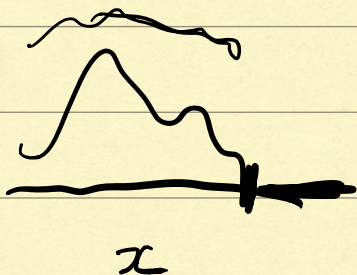
$$E[X] = \int_1^{\infty} x p_x(x) dx$$

$$= \int_1^{\infty} x \frac{1}{x^2} dx = \int_1^{\infty} \frac{1}{x} dx = \infty$$

$$\alpha = 3 \quad p_x = 2 \cdot \frac{1}{x^3}$$

$$E[X] = \int_1^{\infty} x \frac{2}{x^3} dx = \dots = 2$$

$$E[X^2] = \dots \rightarrow \infty$$



FAT TAILS
HEAVY TAILS

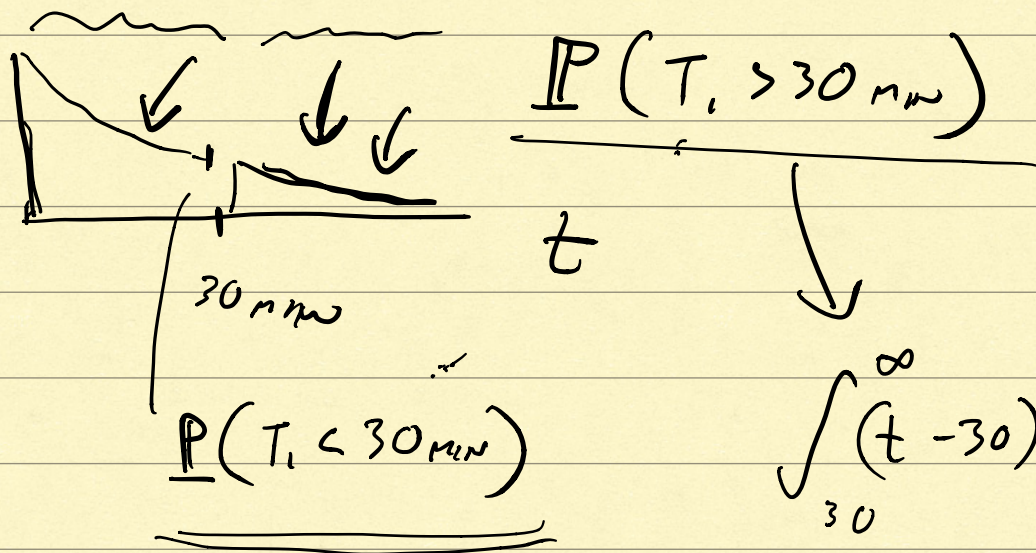
BLACK
SWANS

PROBLEM SET 4A

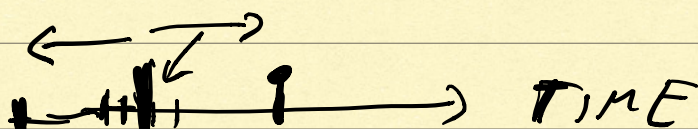
$$E[T] = \int_{30}^{\infty} \underbrace{(t-30)}_{\uparrow} \frac{1}{30} e^{-\frac{1}{30}t} dt$$

$\approx 11 \text{ min}$

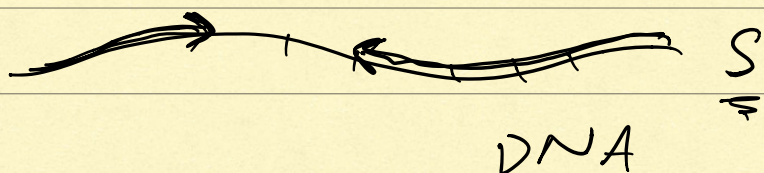
$$p_T(t) = \frac{1}{\gamma} e^{-\frac{t}{\gamma}}$$



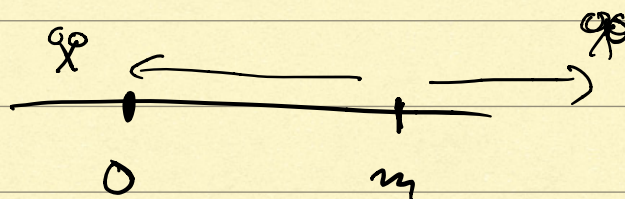
PROBLEM SET 4B



$t=0$



$$P(L_1 = 0)$$



$$P(L_1 < x) \propto x < m$$

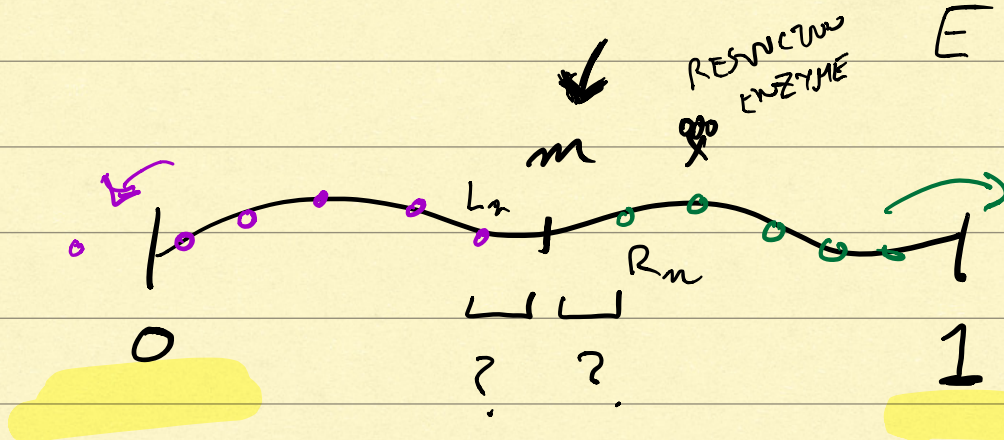
$$P_x(x)$$

$$E[L_1] = \checkmark$$

$$E[R_1]$$

RFLP ?

EMSA ?



$$E[R_n] \rightarrow m \quad n \rightarrow \infty$$

$$E[L_n] \rightarrow m$$

DNA PROTEIN ?
ASSAY

TEAM

SUNATHAN :

$$E[R-L] = \frac{1}{n\lambda}$$

$$\lambda = \left[\frac{1}{nm} \right]$$

DISSENT :

$$E[R] - E[L]$$

$$= \frac{1}{n} \lambda^x$$