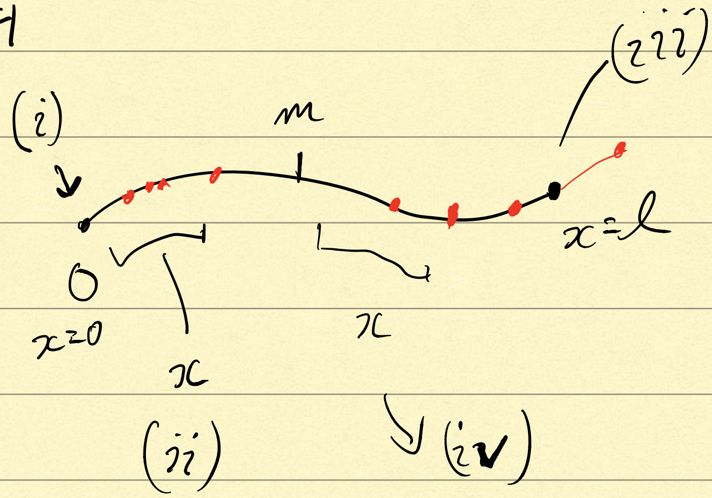
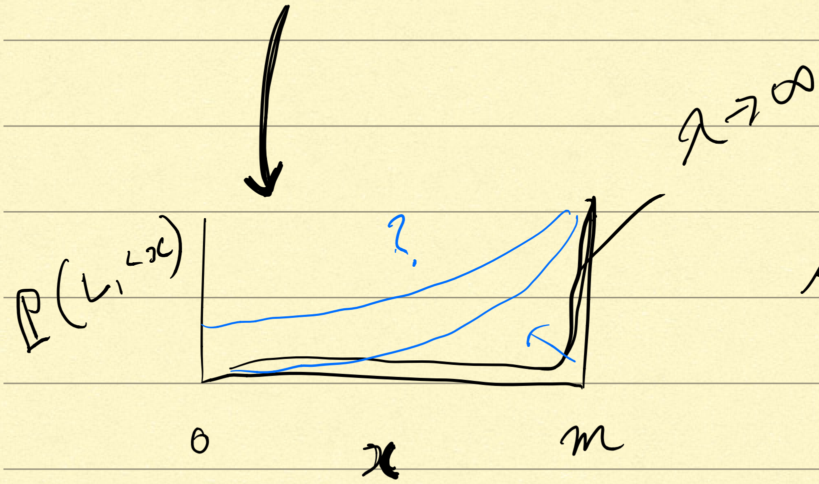
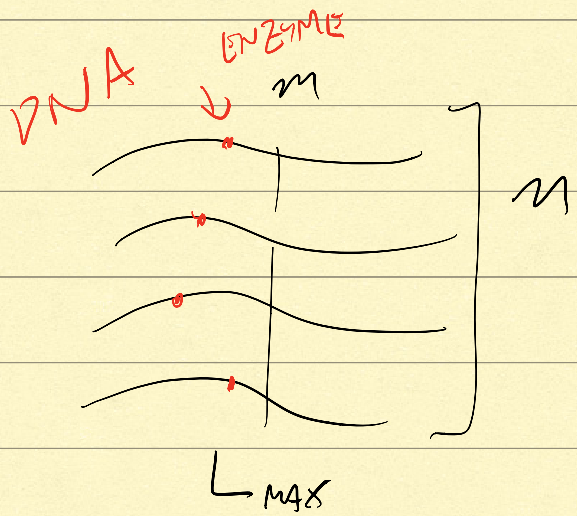
PS4





AS $\lambda \to \infty$

$$\mathbb{P}(L_1 < x) = \begin{cases} 0 & 0 < x < m \\ 1 & x = m \end{cases}$$



$$\mathbb{P}(L_{MAX} < x)$$

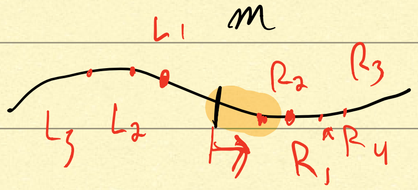
$$= \mathbb{P}(L_1 < x \text{ AND } L_2 < x \text{ AND} \ldots L_n < x)$$

METHOD 1

INDEPENDENT $= \mathbb{P}(L_1 < x) \cdot \mathbb{P}(L_2 < x) \cdots \mathbb{P}(L_n < x)$

IDENTICALLY DISTRIBUTED $= \left(\mathbb{P}(L_1 < x)\right)^n$

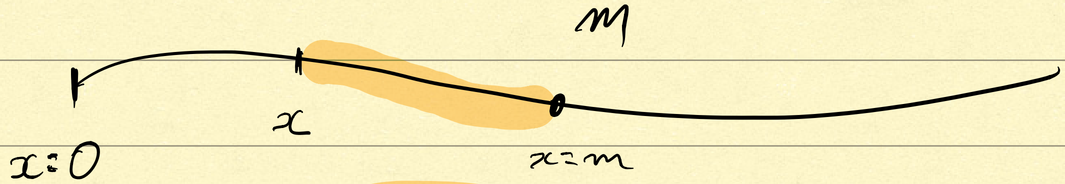
METHOD 2



$\rightarrow$ n POISSON WITH RATE λ

$\min(R_i)$ 1 POISSON WITH RATE $n\lambda$

$\mathbb{P}($ $\qquad e^{-\lambda(m-x)} \qquad 0<$



EXACTLY

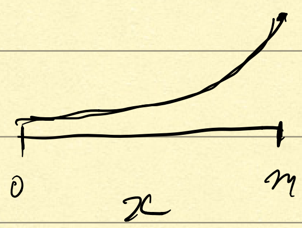
$$\mathbb{P}(i \text{ EVENTS IN } \Delta x) = \frac{(\lambda \Delta x)^i e^{-\lambda \Delta x}}{i!}$$

$i=1$

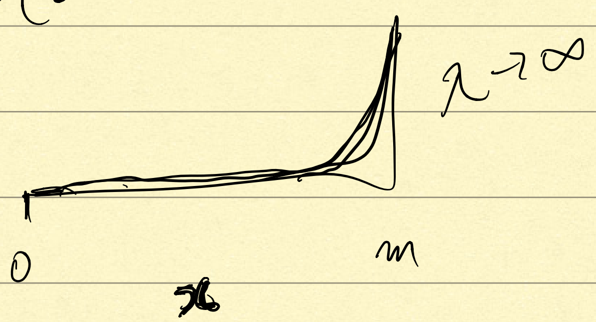
$$\mathbb{P}(L_1 < x) = \mathbb{P}\left(\text{NO EVENTS BETWEEN } x \text{ AND } m\right)$$

$$= \frac{\left(\lambda(m-x)\right)^0 e^{-\lambda(m-x)}}{1}$$

$$= e^{-\lambda(m-x)}$$

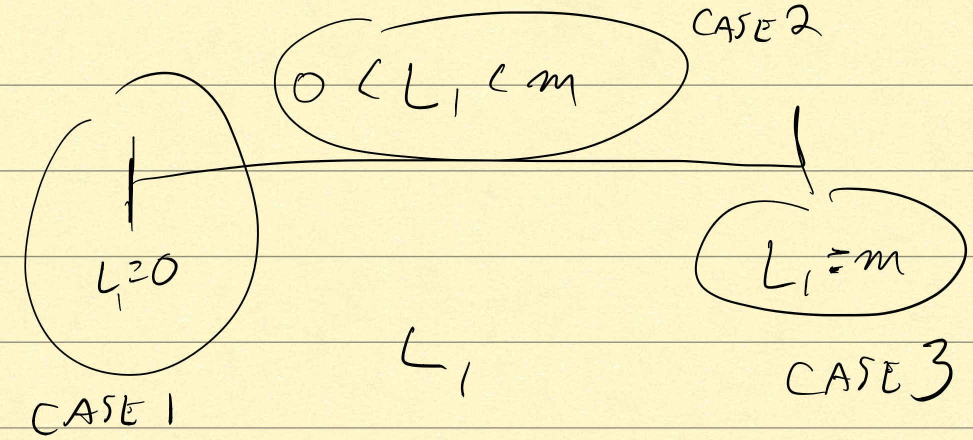


$P(L_1 < x)$ $\quad 0 < x < m$



(v)

$$E[L_1] = E[L_1 \mid \text{CASE } 1]\,\mathbb{P}(\text{CASE } 1) + E[L_1 \mid \text{CASE } 2]\,\mathbb{P}(\text{CASE } 2) + E[L_1 \mid \text{CASE } 3]\,\mathbb{P}(\text{CASE } 3)$$



CASE 2
$0 < L_1 < m$
$L_1 = 0$
L_1
$L_1 = m$
CASE 1
CASE 3