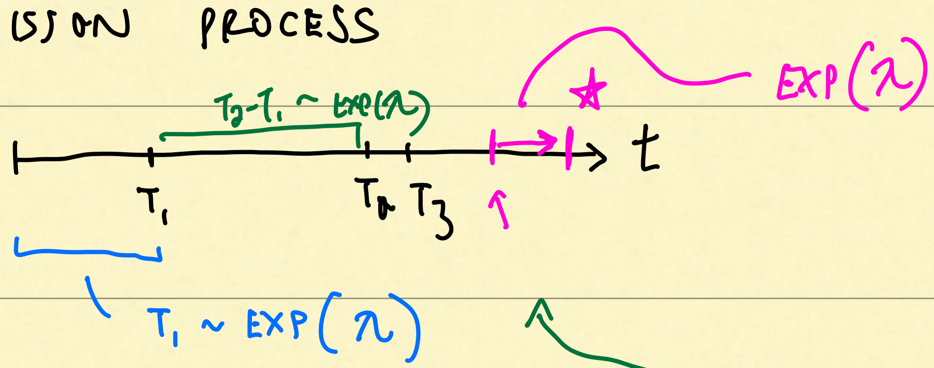
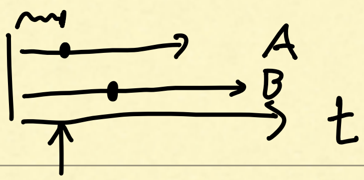
POISSON PROCESS



- MEMORYLESS

$$\mathbb{P}(T_1 \in [t, t+\Delta t] \mid T_1 > t)$$
$$= \mathbb{P}(T_1 \in [0, \Delta t])$$

- IF EVENT A IS POISSON WITH RATE λ_A AND EVENT B IS POISSON WITH RATE λ_B, THEN THE NEXT EVENT IS

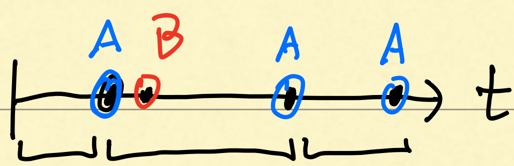


POISSON WITH RATE

$$\lambda = \lambda_A + \lambda_B .$$

RACING PROPERTY

- IF A POISSON PROCESS WITH RATE λ HAS TWO TYPES, A & B, WITH PROBABILITY p_A, $p_B = 1 - p_A$, INDEPENDENT OF TIME, THEN



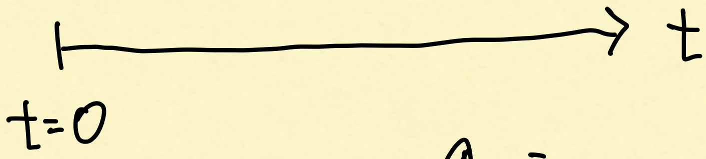
THE EVENTS OF TYPE A ARE POISSON WITH RATE

$P_A \cdot \lambda$.

AND SIMILARLY FOR B.

THINNING PROPERTY

EX. MUTATIONS

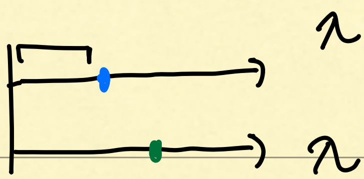


$\lambda = \ \ yr^{-1}$

- CASE 1

TWO GENE LOCI BOTH WITH MUTATION RATE λ

MEAN TIME TO FIRST MUTATION?



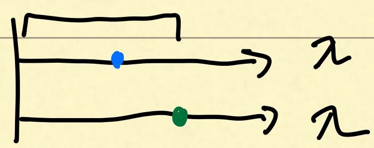
$E[T]$

$T \sim$ ~~POISSON~~ EXP $(\lambda + \lambda)$

$$E[T] = \frac{1}{\lambda+\lambda} = \frac{1}{2\lambda}$$

- CASE 2

MEAN TIME UNTIL BOTH ARE MUTATED?



???

P4B

SUPPOSE $\lambda = \lambda(t)$

NOT $p_T(t) \neq \lambda(t)\, e^{-\lambda(t) \cdot t}$

NONHOMOGENOUS POISSON PROCESS

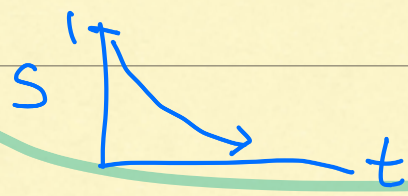
$$F_T(t) = 1 - e^{-\int_0^t \lambda(\tilde{t})\, d\tilde{t}}$$

HAZARD FUNCTION

$S(t) = 1 - F_T(t)$

COMPLENTARY CUMULATIVE

SURVIVAL FUNCTION



PIO