POISSON PROCESS

RATE λ, $\quad E[T] = \frac{1}{\lambda}$

- MEMORYLESS

$$\mathbb{P}(T < 10_{MIN} \mid T > 5_{MIN}) = \mathbb{P}(T < 5_{MIN})$$

- RACING

2 PROCESSES, λ_1 λ_2

FIRST TO OCCUR HAS RATE $\lambda_1 + \lambda_2$

$$\downarrow$$

$$E[T_{FIRST}] = \frac{1}{\lambda_1 + \lambda_2}$$

- THINNING

1 PROCESS WITH RATE λ,

EVENT IS A OR B WITH PROBABILITY

P_A, $P_B = 1 - P_A$, THEN

A IS POISSON WITH RATE λP_A

B IS POISSON WITH RATE λP_B

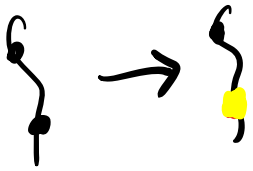
CASE 0: 1 MUTATION

DNA $\lambda_0 = yr^{-1}$

THEN $E[T] = \frac{1}{\lambda} = 1\,yr$

CASE 1 : EITHER

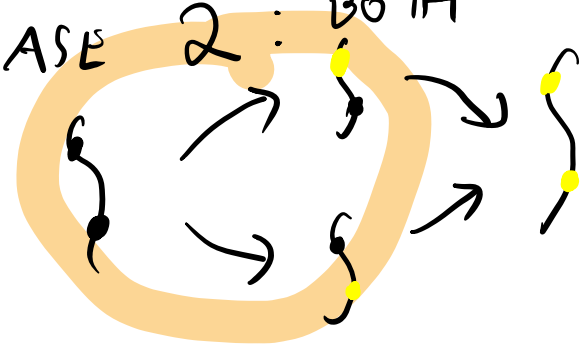
OR



$\lambda = \lambda_0 + \lambda_0$

$E[T_{FIRST}] = \frac{1}{2\lambda} = 0.5\,yr$

CASE 2 : BOTH



$E[T_{BOTH}] = ?$

- 1 yr — 1
- (1, 2) yr — 9
- 2y — 1
- > 2yr — 0

1.5 yr

DISCRETE TIME MARKOV CHAIN

$$\vec{p}_{t+1} = \underline{\underline{M}} \cdot \vec{p}_t$$

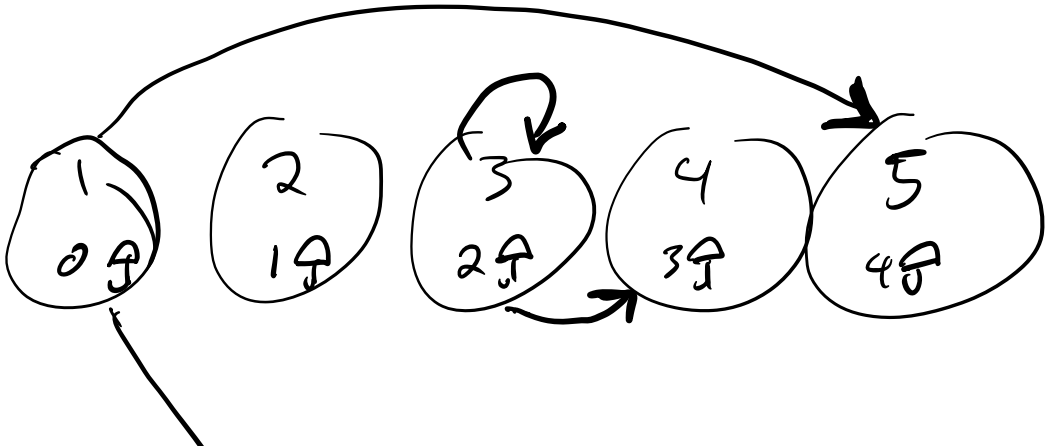
$$\underline{\underline{M}} = \begin{bmatrix} p_{1\to 1} & & \\ & \ddots & \\ & & p_{6\to 6} \end{bmatrix}$$

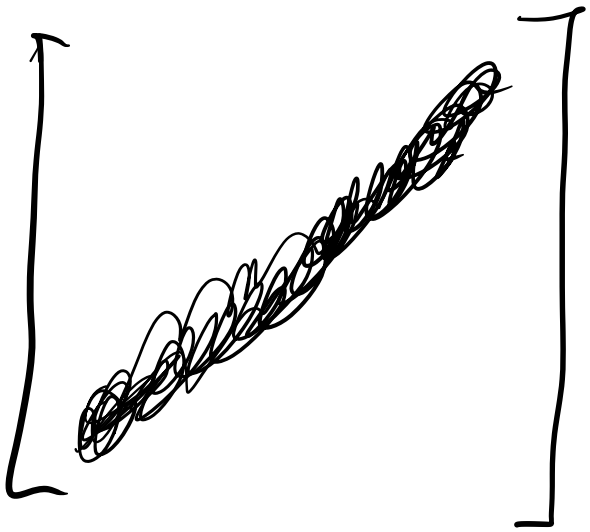
MEAN TIME FROM (k) TO (j)

$$\begin{bmatrix} -1 \\ -1 \\ -1 \\ \vdots \end{bmatrix} = \left(\underline{\underline{M}}_{-j} - I \right) \cdot \vec{T}_j$$

$$\begin{bmatrix} T_{1j} \\ \vdots \\ T_{kj} \\ \vdots \\ T_{6-j} \end{bmatrix}$$

PS 3





6×6