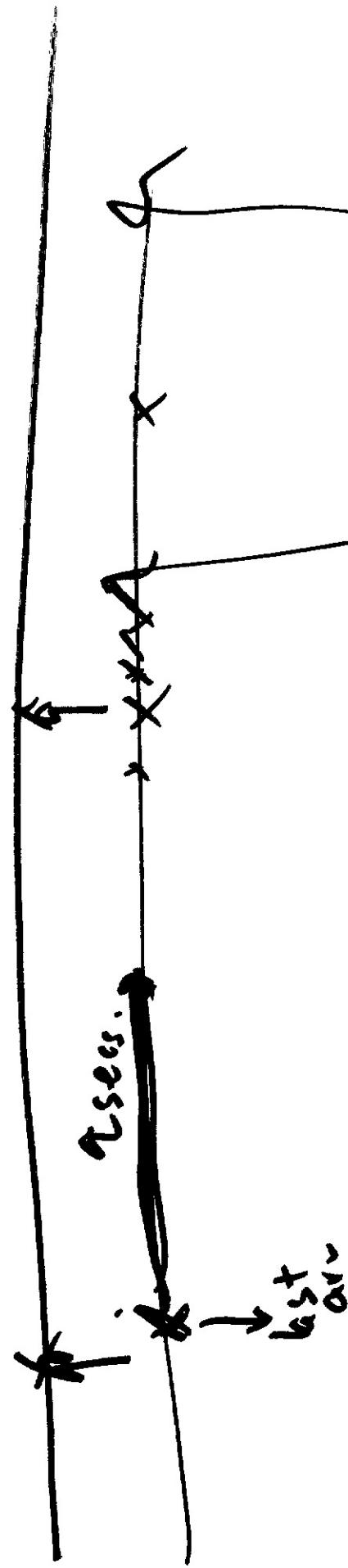


Poisson Process (Cont'd) .

Memoryless Property

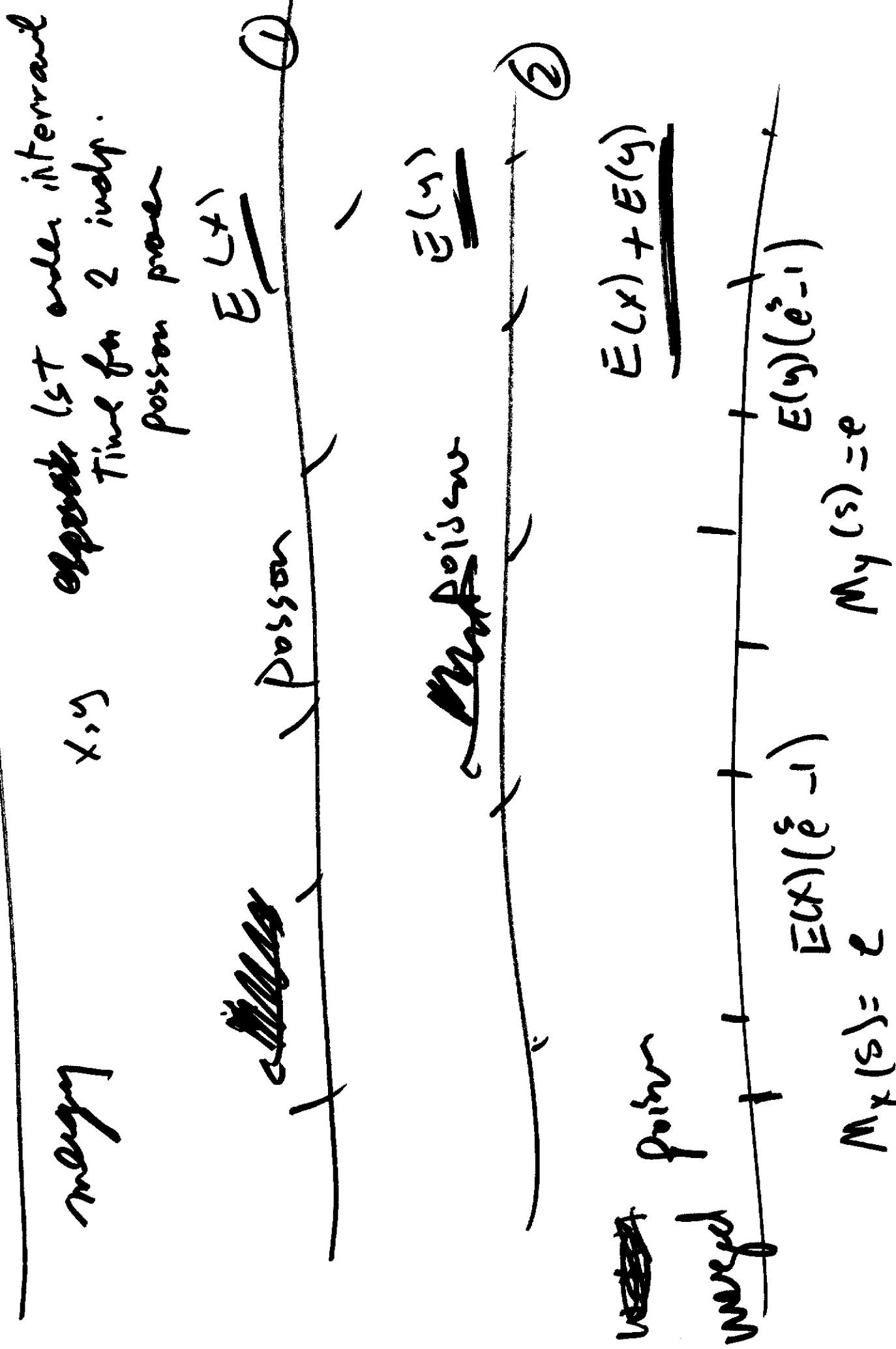
Start a Poisson process ;
if seconds has elapsed since the last arrival.
~~not~~ Conditional pdf of Δt , - Σ
is still Poisson ; indep of t



Fresh Start .

At t , The history of the process
after time t is also a process .
and indep of history of the process until time t .

Merging + splitting of a Poisson Process



$$W = Y + Y_1$$

$$\begin{aligned} M_{WY}(s) &= M_Y(s) M_{Y_1}(s) \\ &= e^{\left\{E(s) + E(u)\right\} \lambda e^{s - 1}} \\ &= e^{-\left(E(s) + E(u)\right) \lambda_0} \\ &\quad - \frac{e^{-\left(E(s) + E(u)\right) \lambda_0}}{E(s) + E(u)} e^{\lambda_0 s}. \end{aligned}$$

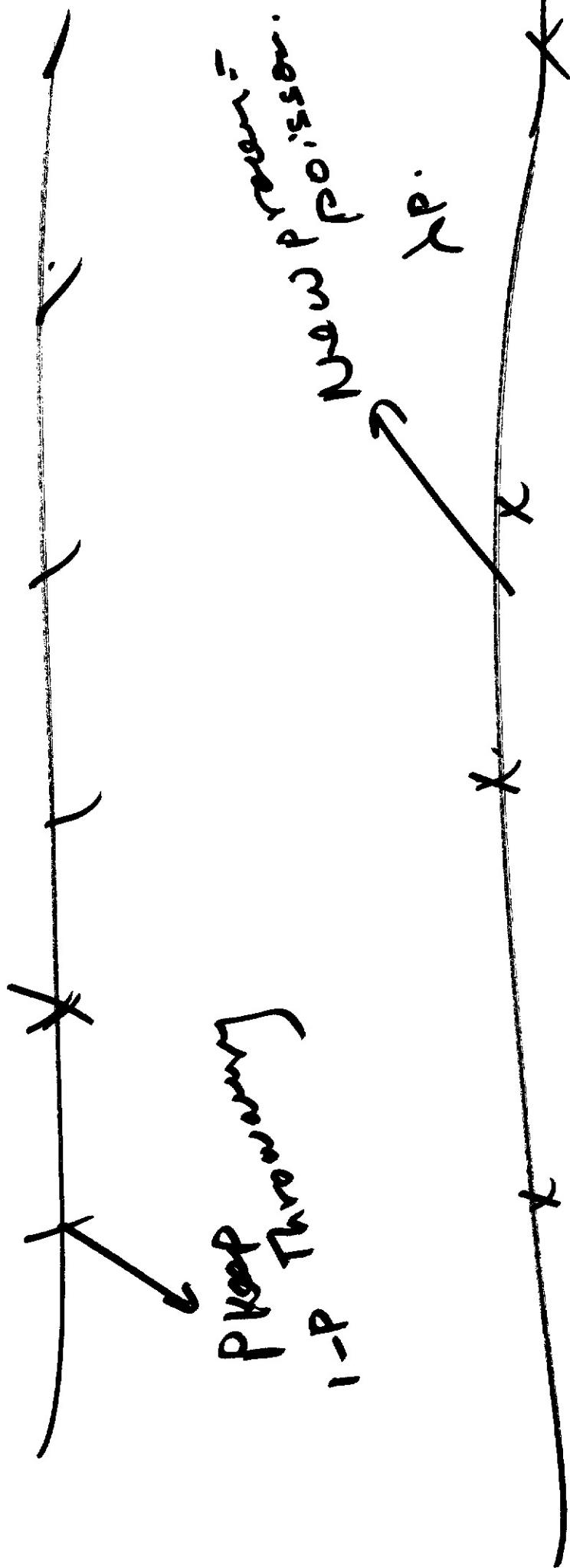
Given 2 Poisson Processes with
Arrival rates of λ_1 & λ_2 is another
Poisson.

Splitting of Poisson

original

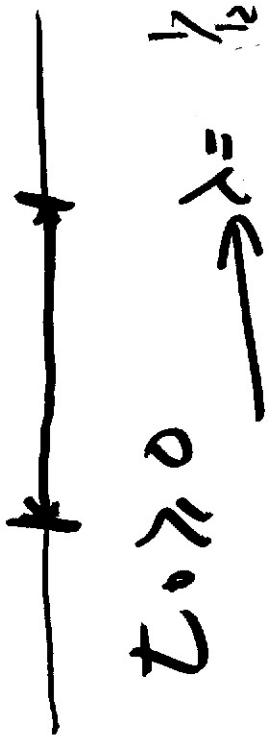
Poisson.

lambda.



Ex pdf independent interval times between successive cars in high way is

- $\lambda e^{-\lambda t}$



$$f_K(t_0) = \begin{cases} \lambda e^{-\lambda t_0} & t_0 > 0 \\ 0 & t_0 \leq 0 \end{cases}$$

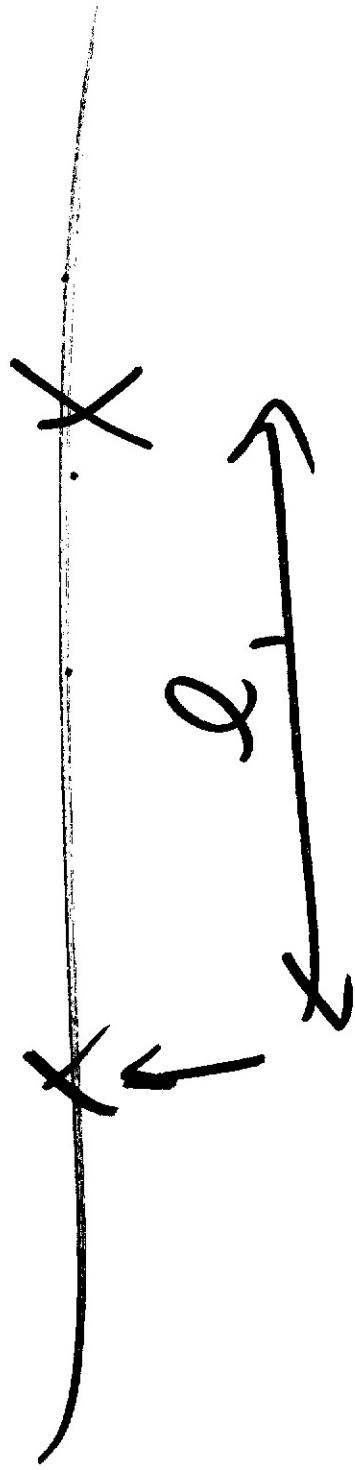
$$t_0 > 0 \rightarrow \lambda =$$

$$1/\lambda$$

Q somewhat requires 12 secs to cross.
starts immediately after a car.

$$\text{Prob of survives? } P(K; t) = \frac{(t/\lambda)^K e^{-t/\lambda}}{K!}$$

$$P(0; 12) = \frac{e^{-12}}{0!} = 0.368.$$



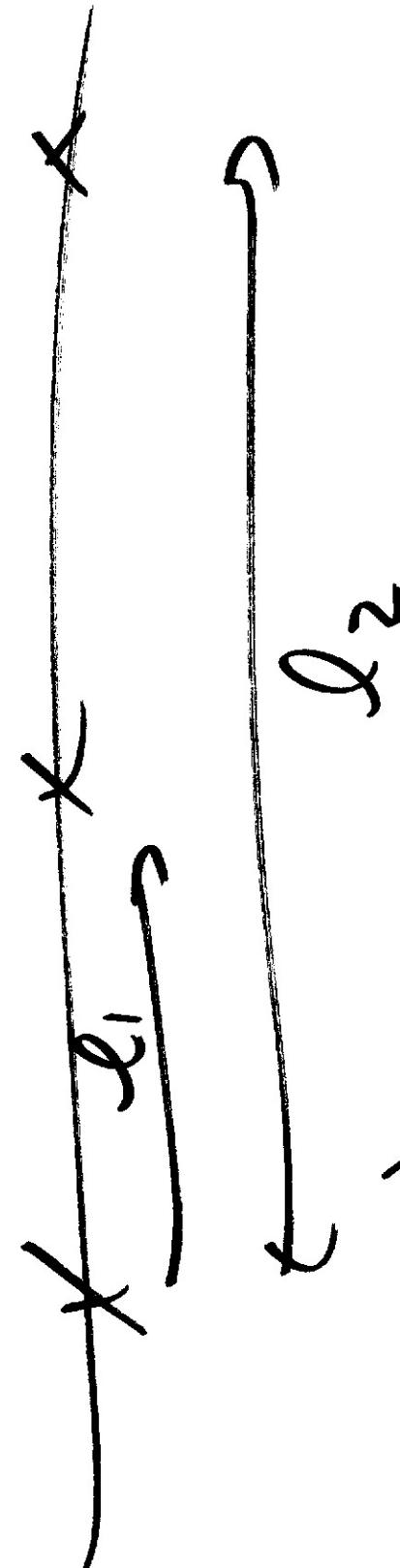
$$\text{Survival} = \Pr(d_1 > t)$$

$$= \begin{cases} f_t(t_0) & d_{t_0} = \\ t_0 = 12 & -t/12 \\ \frac{1}{12} e^{-t/12} & dt = 0.368 \\ \int_{t_0}^{\infty} & \\ \int_{12}^{\infty} & \\ = & t = 12 \end{cases}$$

6

Q Show wombat: $\frac{24 \text{ secs}}{2 \text{ cats}} T_0 \text{ die.}$

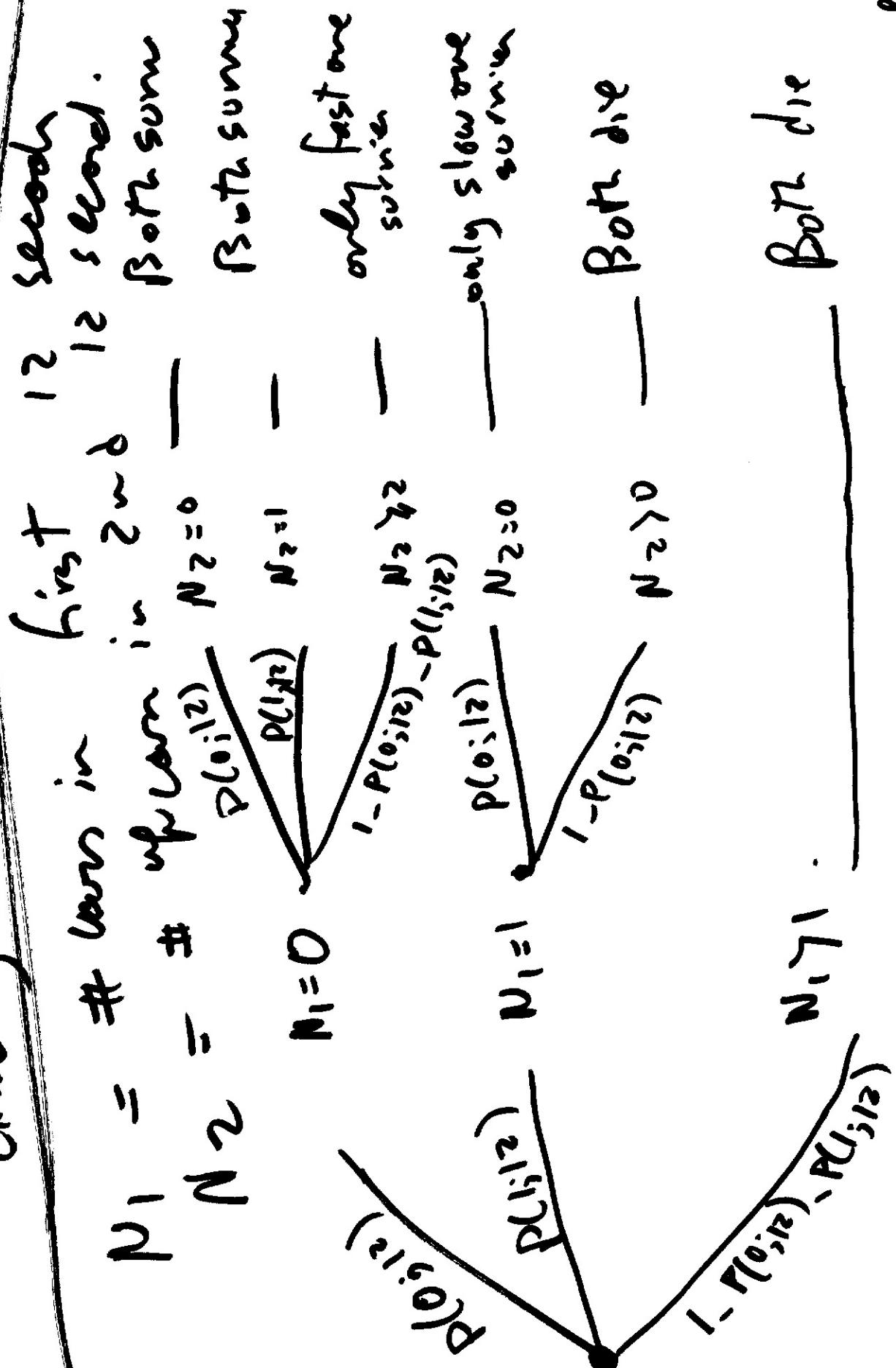
what is prob of survival.



$$\text{Q, P}(l_2 | \gamma_{24}) = p(0; 24) + p(1; 24) + p(2; 24) = 3e^{-2} = 0.406$$

②

~~Both~~ ~~both~~ ~~both~~ ~~both~~
 Q leave at the same time .
 but in prob. that
 exactly one survive .



P(exactly one combat success) =

$$\begin{aligned} & P(N_1=0, N_2 \geq 2) + P(N_1=1, N_2=0) \\ & \text{with } G = P(0; l_2) L_1 - P(0; l_2) - P(l_3; l_2) \\ & \quad + P(l_3; l_2) P(0; l_2) \\ & = e^{-l_1} - e^{-l_2} = 0.233. \end{aligned}$$

$$f_X(t_0) = \begin{cases} \lambda e^{-\lambda t_0} & t_0 \\ 0 & \text{else.} \end{cases}$$

lifetime of a bulb.

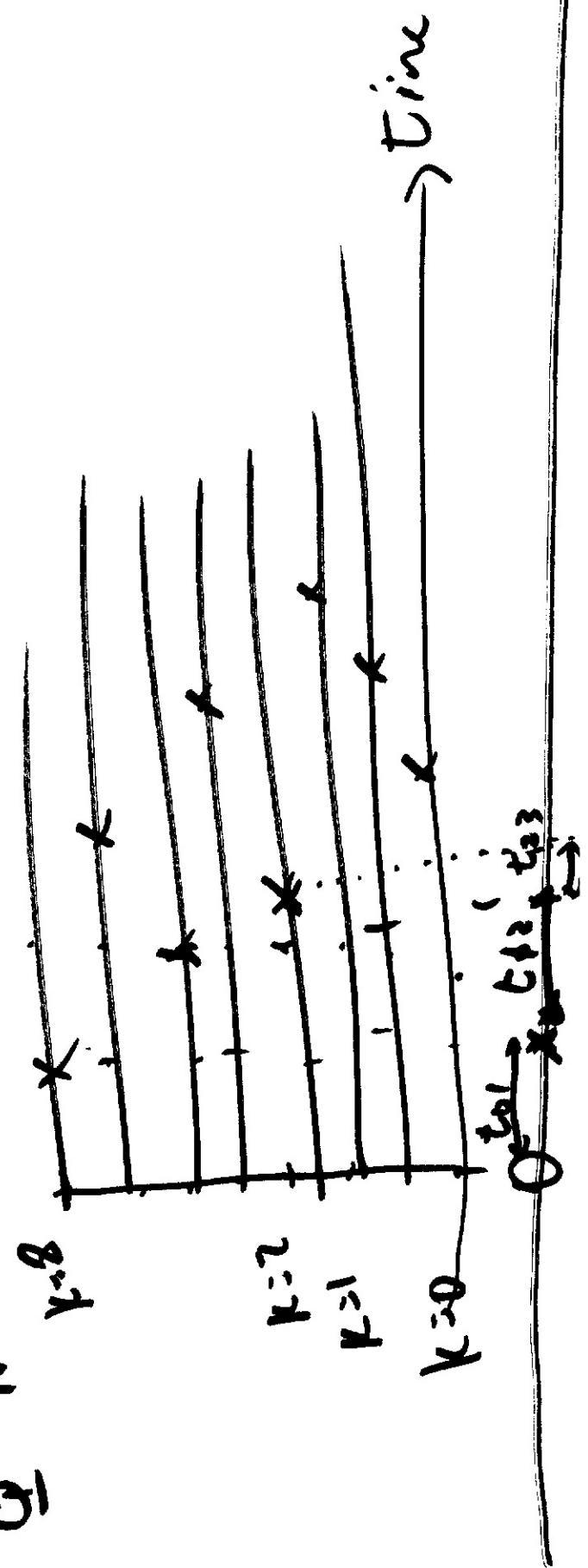
8 bulbs on.

we turn

time until 3rd failure.

y_j = R.V. mean + variance and transform y_j .

$$\Omega$$



$$\text{total} \rightarrow t_1, t_2, t_3$$

Defn: $t_{01} = \text{Time from start until } \underline{1^{\text{st}}} \text{ Farkie.}$

$$t_{12} = \text{time from } \frac{\text{list failure}}{\text{2nd failure}} \text{ to } \frac{\text{2nd failure}}{\text{3rd failure}}$$

$t_{23} = \text{time}$

$$t_1 + t_2 + t_3 + t_4$$

$$S = t^{\alpha}$$

181
P. P. D.
Massachusetts
Boston
Massachusetts
Boston
Massachusetts
Boston

It is
true
that
the
whole
of
the
country
is
not
so
bad
as
you
think

Perison
Pigeon
S. T. Z.
animal
rotated
61.

$$\epsilon(v) = \frac{E(t_0)}{8\gamma} + \frac{1}{t_1} + \frac{1}{t_2} + \frac{1}{t_3}$$

61

$$b^2 \gamma = C_{t,0}^2 + C_{t,1,1}^2 + C_{t,2,3}^2$$

$$= \left(\frac{1}{8\lambda}\right)^2 + \left(\frac{1}{7\lambda}\right)^2 + \left(\frac{1}{6\lambda}\right)^2$$

$$M_y(s) = M_{t,0,1}(s) \times M_{t,1,2}(s) \times M_{t,2,3}(s)$$

$$M_y(s) = \frac{s+7\lambda}{s+8\lambda} \cdot \frac{s+7\lambda}{s+6\lambda}$$

n

6. Toe waiting for a bus. for:
Newport \rightarrow Fresno
 $N \rightarrow F$.
 $F \rightarrow N$

Right
Fresno
 $F \rightarrow N$.
wrong.

Arrived $\{NF\}$ is position with voter
 F_N
 $\{N\}$ $\{NF\}$ $\{N\}$ $\{NF\}$
Right
Wrong

until right bus
 $K = \#$ of wrong houses until arrives.
more.

Q: $P_{MF} \text{ of } K?$.

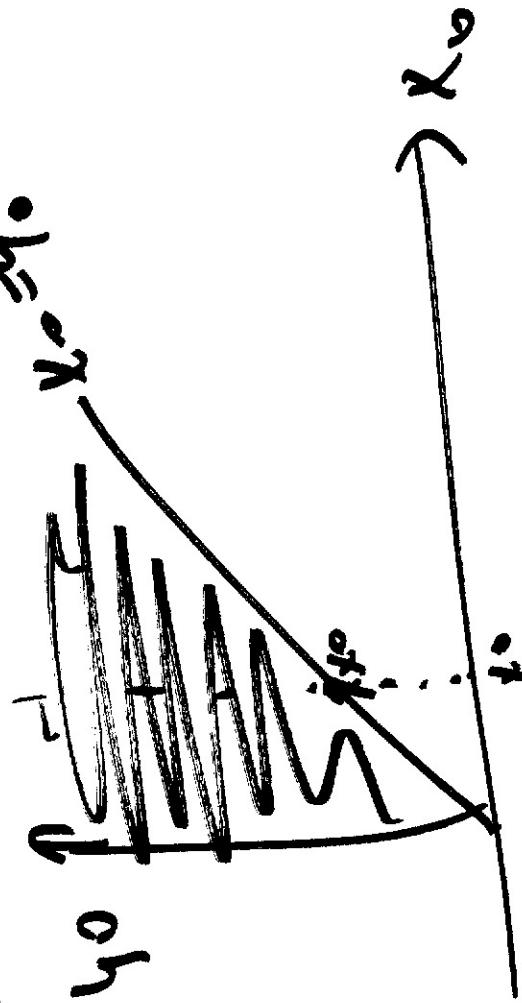
$X = R.V.$ - wait for next bus.
 $y = \epsilon \cdot V$. Time to wait for the next bus

$$P(\text{next bus is } w_m) = \Pr(X < y)$$

$$\Pr(X < y) = \Pr(X_0 > y)$$

$$F_X(x_0) = \lambda_w e^{-\lambda_w x_0}$$

$$F_X(y_0) = \lambda_w e^{-\lambda_w y_0}$$



$$P(\text{next house is won}) = P(x < y) =$$

$$= \left\{ \begin{array}{l} dx_0 \\ dy_0 \end{array} \right\} \frac{dy_0 - y_0}{dx_0 - x_0} e^{-\frac{(y_0 - y_0)^2}{2}}$$

$$\begin{aligned} y_0 &= 0 \\ x_0 &= 0 \end{aligned}$$

$$\frac{1}{1+f}$$

Pr next house is won.

$$\frac{1}{1+f}$$

