$f(x|k,\lambda) =$

$$f_T(t) = f_{T|0}(t|0)\pi_0 + f_{T|1}(t|1)\pi_1 + \cdots$$

$\lambda \to \mu$

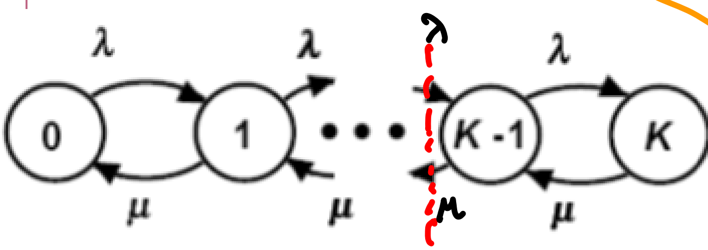
$k \to n+1$

$$f_T(t) = \sum_{n=0}^{\infty} (1-\rho)\rho^n \frac{\mu(\mu t)^n e^{-\mu t}}{n!}$$

$$\pi_i = \rho^i \cdot \pi_0 = \rho^i(1-\rho)$$

$$f_{T|N}(t|n) = \frac{\mu(\mu t)^n e^{-\mu t}}{n!}$$

$$e^\alpha = \sum_{n=0}^{\infty} \alpha^n / n!$$



$\pi_{n+1} \cdot \lambda = \pi_n \cdot \mu$ $\qquad \rho \equiv \frac{\lambda}{\mu}$

$\pi_n = \rho \cdot \pi_{n-1}$

$$\pi_i = \frac{\rho^i}{i!}\pi_0$$

$\sum_{i=0}^{\infty} \pi_i = 1 \Rightarrow \pi_0 \sum_{i=0}^{\infty} \frac{\rho^i}{i!} = 1 \Rightarrow \pi_0 e^{\rho} = 1$

$\Rightarrow \pi_0 = e^{-\rho}$

$$\pi_{k-1}\mu = k\lambda\pi_k$$

$$\pi_k = \frac{1}{k!}(\frac{\mu}{\lambda})^k\pi_0$$

$\pi_0 \mu = \lambda \pi_1 \Rightarrow \pi_1 = \frac{\mu}{\lambda}\pi_0$

$\pi_1 \mu = 2\lambda\pi_2 \Rightarrow \pi_2 = \frac{1}{2}\cdot\frac{\mu}{\lambda}\pi_1 = \frac{1}{2}\cdot\left(\frac{\mu}{\lambda}\right)^2\pi_0$