$$Q = \begin{bmatrix} -\lambda & \lambda & 0 & 0 & \cdots \\ \mu & -(\lambda+\mu) & \lambda & 0 & \cdots \\ 0 & 2\mu & -(2\mu+\lambda) & \lambda & \cdots \\ & & \vdots & \ddots & \end{bmatrix}$$

$$\pi Q = 0$$

$$\begin{cases} \sum_{i=1}^{n} \pi_i = 1 \\ \lambda \pi_1 = \mu \pi_2 \\ \lambda \pi_2 = 2\mu \pi_3 \\ \vdots \\ \lambda \pi_{n-2} = 2\mu \pi_{n-1} \end{cases}$$

$$\pi_2 = \frac{\lambda \pi_1}{\mu}, \quad \pi_3 = \frac{\lambda^2 \pi_1}{2\mu^2}$$

$$\pi_4 = \frac{\lambda^3 \pi_1}{2^2 \mu^3}, \ldots, \pi_n = \frac{\lambda^{n-1} \pi_1}{2^{n-2} \mu^{n-1}}$$

$$\sum \pi_i = \pi_1 + \frac{\lambda \pi_1}{\mu} + \frac{\lambda^2 \pi_1}{2\mu^2} + \dots$$

$$\dots + \frac{\lambda^{n-1} \pi_1}{2^{n-2} \mu^{n-1}} + \dots$$

$$= 1$$

$$\pi_1 \left(1 + \frac{\lambda}{\mu} + \frac{\lambda^2}{2\mu^2} + \dots \right)$$

$$= \pi_1 \left(1 + \sum_{i=1}^{n-1} \frac{1}{2^{i-1}} \left(\frac{\lambda}{\mu} \right)^i \right)$$

$$\pi_1 \left(1 + \frac{2}{2} \sum_{i=1}^{n-1} \frac{1}{2^{i-1}} \left(\frac{\lambda}{\mu} \right)^i \right) =$$

$$\pi_1 \left(2 \sum_{i=0}^{n-1} \left(\frac{\lambda}{2\mu} \right)^i - 1 \right) =$$

$$\pi_1 \left(2 \left(\frac{1}{1 - \frac{\lambda}{2\mu}} \right) - 1 \right) = 1$$

$$\pi_1 = \frac{1}{2\left(\frac{1}{1-\frac{\lambda}{2\mu}}\right)-1}$$

$$\pi_2 = \frac{\lambda}{\mu}\pi_1 = \frac{\lambda}{\mu}\left(\frac{1}{2\left(\frac{1}{1-\frac{\lambda}{2\mu}}\right)-1}\right)$$

$$\pi_3 = \frac{\lambda^2}{2\mu^2}\left(\frac{1}{2\left(\frac{1}{1-\frac{\lambda}{2\mu}}\right)-1}\right)$$

$\vdots$

$$\pi_n = \frac{\lambda^{n-1}}{2^{n-2}\mu^{n-1}}\left(\frac{1}{2\left(\frac{1}{1-\frac{\lambda}{2\mu}}\right)-1}\right)$$

$$b = \frac{1}{2\left(\frac{1}{1-\frac{\lambda}{2\mu}}\right)-1}$$

$$L = \sum_{k=0}^{\infty} \pi_k \cdot k$$

$$6 \cdot \left(\left[\sum_{k=2}^{\infty} k \cdot \frac{\lambda^{k-1}}{2^{k-2}\mu^{k-1}} \right] + 1 + \frac{\lambda}{\mu} \right)$$

$$\sum_{k=2}^{\infty} (k-2) \quad \frac{\lambda^{k-1}}{2^{k-2}\mu^{k-1}}$$