



$$\pi_0 + \pi_1 + \pi_2 = 1$$

$$\begin{aligned}
 & \cancel{P_{00}}\pi_0 + P_{01}\pi_1 + \cancel{P_{02}}\pi_2 \\
 & + P_{10}\pi_0 + \cancel{P_{11}}\pi_1 + P_{12}\pi_2 \\
 & + \cancel{P_{20}}\pi_0 + P_{21}\pi_1 + \cancel{P_{22}}\pi_2
 \end{aligned}$$

So, First condition $\lambda = 1$

Where we have

$$P_{10} = P_{12} = 1/2; P_{01} = P_{21} = 1$$

$$\pi_0 + \pi_1 + \pi_2 = 1 \rightarrow \textcircled{1}$$

$$\cancel{P_{00}}\pi_0 + P_{01}\pi_1 = \pi_0 \quad - \textcircled{2}$$

$$P_{01}\pi_0 + P_{21}\pi_2 = \pi_1 \quad - \textcircled{3}$$

$$P_{12}\pi_1 = \pi_2 \quad - \textcircled{4}$$

Substituting the values in equ (2) ($P_{10} = 1/2$) we have

$$1/2 \pi_1 = \pi_0$$

$$\therefore \pi_1 = 2\pi_0 \rightarrow (5)$$

Substitute the value of P_{12} in equ (4) we have

$$1/2 \pi_1 = \pi_2$$

$$\therefore \pi_1 = 2\pi_2 \rightarrow (6)$$

$$\pi_1 = 2\pi_0 = 2\pi_2$$

Substitute P_{01} and P_{21} values in equ (3)

$$\pi_0 + \pi_2 = \pi_1 \rightarrow (7)$$

Substitute the values of π_2 & π_0 from equ (5) and (6) in equ (7)

Then we have

$$\pi_1/2 + \pi_1 + \pi_1/2 = 1$$

$$2\pi_1 = 1$$

$$\pi_1 = 1/2$$

Substitute the value of π_1 in equ (5) and (6) we got

$$\pi_2 = 1/4 \text{ and } \pi_0 = 1/4$$

Second condition $\lambda \neq \mu$
we have

$$P_{12} = \frac{\lambda}{\lambda + \mu}$$

$$P_{10} = \frac{\mu}{\lambda + \mu}$$

$$P_{01} = P_{21} = 1$$

From the matrix we have

$$\pi_0 + \pi_1 + \pi_2 = 1 \rightarrow \textcircled{1}$$

$$P_{10}\pi_1 = \pi_0 \rightarrow \textcircled{2}$$

$$P_{21}\pi_2 + P_{01}\pi_0 = \pi_1 \rightarrow \textcircled{3}$$

$$P_{21}\pi_1 = \pi_2 \rightarrow \textcircled{4}$$

Substitute the values

$$\left(\frac{\mu}{\lambda + \mu}\right) \pi_1 = \pi_0 \rightarrow \textcircled{5}$$

$$\pi_2 + \pi_0 = \pi_1 \rightarrow \textcircled{6}$$

$$\left(\frac{\lambda}{\lambda + \mu}\right) \pi_1 = \pi_2 \rightarrow \textcircled{7}$$

Substitute the value π_0 and π_2 in eqn ①

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

we got

$$2\pi_1 = 1$$

$$\pi_1 = 1/2$$

Thus

$$\pi_0 = \frac{\mu}{2\lambda+2\mu} //$$

$$\pi_2 = \frac{\lambda}{2\lambda+2\mu} //$$