Solution for exercise 6.4.2 in Karlin and Pinsky

We know $\theta_i = (\frac{\lambda}{\mu})^i$ and that a stationary distribution exist, if

$$\sum_{i=0}^{\infty} \theta_i < \text{infty}$$

$$\Leftrightarrow \sum_{i=0}^{\infty} \left( \frac{\lambda}{\mu} \right)^i < \infty$$

$$\Leftrightarrow \left | \frac{\lambda}{\mu} \right | < 1$$

In this case the stationary distribution becomes:

$$p_{i,j} = \frac{\theta_j}{\sum_{k=0}^{\infty} \theta_k}$$

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