IMM - DTU

02407 Stochastic Processes
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DAME/dame

# 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

$$\begin{aligned} \sum_{i=0}^{\infty} \theta_i &< infty \\ \Leftrightarrow \sum_{i=0}^{\infty} (\frac{\lambda}{\mu} &< \infty \\ \Leftrightarrow |\frac{\lambda}{\mu}| &< 1 \end{aligned}$$

In this case the stationary distribution becomes:

$$\begin{aligned} pi_j &= \frac{\theta_j}{\sum_{k=0}^{\infty} \theta_k} \\ &= (\frac{\lambda}{\mu})^j (1 - \frac{\lambda}{\mu}) \end{aligned}$$