You may find the following information useful:

- Steady-state probabilities of a birth-death process:

$$\pi_j = \frac{d_j}{D} \quad \text{for } j = 0, 1, 2, \ldots \qquad \text{where} \qquad d_0 = 1 \qquad d_j = \frac{\lambda_0 \lambda_1 \cdots \lambda_{j-1}}{\mu_1 \mu_2 \cdots \mu_j} \quad \text{for } j = 1, 2, \ldots \qquad D = \sum_{i=0}^{\infty} d_i$$

- Steady state probabilities of an M/M/s system:

$$\pi_0 = \left[\left(\sum_{j=0}^{s} \frac{(s\rho)^j}{j!} \right) + \frac{s^s \rho^{s+1}}{s!(1-\rho)} \right]^{-1} \qquad \pi_j = \begin{cases} \dfrac{(\lambda/\mu)^j}{j!} \pi_0 & \text{for } j = 1, 2, \ldots, s \\ \dfrac{(\lambda/\mu)^j}{s! s^{j-s}} \pi_0 & \text{for } j = s+1, s+2, \ldots \end{cases} \qquad \text{where} \qquad \rho = \frac{\lambda}{s\mu}$$

- Expected number of customers in queue for an M/M/s system:

$$\ell_q = \frac{\pi_s \rho}{(1-\rho)^2} \qquad \text{where} \qquad \rho = \frac{\lambda}{s\mu}$$

- Poisson random variable L with parameter λ/μ:

$$L \sim \text{Poisson}(\lambda/\mu): \qquad p_L(n) = \frac{e^{-\lambda/\mu}(\lambda/\mu)^n}{n!} \quad \text{for } n = 0, 1, 2, \ldots \qquad E[L] = \lambda/\mu$$