Solution to Problem 2.8

(a) This is the same as the earlier problem (2.7) substituting $e^{-a/m}$ instead of the variable $a$ used there.

(b) For $\alpha \to \infty$, the system degenerates to a queue with only two states 0 and 1 with $\lambda_0 = \lambda$, $\lambda_1 = 0$, $\mu_0 = 0$ and $\mu_1 = \mu$. This may be easily solved to get

$$p_0 = \frac{1}{1 + \rho} \quad p_1 = \frac{\rho}{1 + \rho} \quad \text{with} \quad \rho = \frac{\lambda}{\mu}$$

The average number in the system $N = \frac{\rho}{1 + \rho}$