Solutions to Problem 1.

- **State space.** $\mathcal{M} = \{0, 1, 2, \dots\}$
  Each state represents the number of customers in the ice-cream shop, including those in the queue and those being served.
- **Arrival rates.**
$$\lambda_i = \begin{cases} 20\left(1 - \frac{i}{5}\right) & \text{for } i = 0, 1, \dots, 5 \\ 0 & \text{for } i = 6, 7, \dots \end{cases}$$
- **Service rates.**
$$\mu_i = 10 \qquad \text{for } i = 1, 2, \dots$$

Note that the service rates for $i = 6, 7, \dots$ are not relevant, since those states will never be reached.

Solutions to Problem 2.

- **State space.** $\mathcal{M} = \{0, 1, 2, \dots\}$
  Each state represents the number of customers at the service counter, including those in the queue and those being served.
- **Arrival rates.**
$$\lambda_i = 45 \qquad \text{for } i = 0, 1, 2, \dots$$
- **Service rates.**
$$\mu_i = \begin{cases} 30 & \text{if } i = 1, 2 \\ 60 & \text{if } i = 3, 4, \dots \end{cases}$$