**Solutions to Problem 1.**

- **State space.** $\mathcal{M} = \{1, 2, 3, 4\}$.
  State 1 corresponds to station A, state 2 corresponds to station B, state 3 corresponds to station C, and state 4 corresponds to station D.

- **Time step.** Each time step corresponds to one trip.

- **Transition probabilities.**

$$\mathbf{P} = \begin{bmatrix} 0 & 1/2 & 1/2 & 0 \\ 1/3 & 0 & 1/3 & 1/3 \\ 1/3 & 1/3 & 0 & 1/3 \\ 1/3 & 1/3 & 1/3 & 0 \end{bmatrix}$$

- **Initial state probabilities.** $q_1 = q_2 = q_3 = q_4 = 1/4$.

**Solutions to Problem 2.**

- **State space.** $\mathcal{M} = \{1, 2, 3, 4, 5\}$. State 1 corresponds to the customer inserting a card, state 2 corresponds to a withdrawal, state 3 corresponds to a deposit, state 4 corresponds to obtaining information, and state 5 corresponds to completing business.

- **Time step.** Each time step corresponds to one transaction.

- **Transition probabilities.**

$$\mathbf{P} = \begin{bmatrix} 0 & 0.5 & 0.4 & 0.1 & 0 \\ 0 & 0 & 0.05 & 0.05 & 0.9 \\ 0 & 0.05 & 0 & 0.05 & 0.9 \\ 0 & 0.05 & 0.05 & 0 & 0.9 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

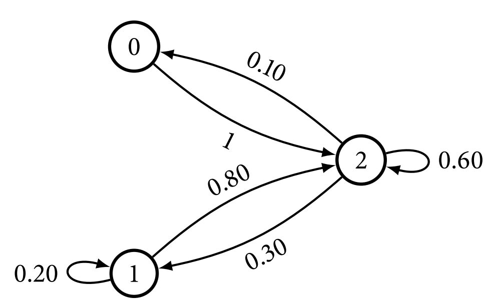
- **Initial state probabilities.** $q_1 = 1, q_2 = q_3 = q_4 = q_5 = 0$

**Solutions to Problem 3.**

- **State space.** $\mathcal{M} = \{0, 1, 2\}$. Each state corresponds to the number of working computers at the beginning of the day.

- **Time step.** Each time step corresponds to one day (from the beginning of one day to the beginning of the next day).

- **Transition probabilities.**




  For state 1, note that if 1 computer is working, then 1 computer is being repaired and will return the next day.

- **Initial state probabilities.** $q_0 = 0, q_1 = 0, q_2 = 1$.