

Assignment-6

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Question 34.2023) Let $X_{n \geq 1}$ be a Markov chain (by Markov's property and using transition probability matrix) with state space $\{1, 2, 3\}$ and transition probability matrix

$$\begin{pmatrix} \frac{1}{2} & \frac{1}{4} & \frac{1}{4} \\ \frac{1}{3} & \frac{1}{3} & \frac{1}{3} \\ 0 & \frac{1}{2} & \frac{1}{2} \end{pmatrix}$$

Then $\Pr(X_2 = 1 | X_1 = 1, X_3 = 2)$ equals

Solution: Consider transition matrix as:

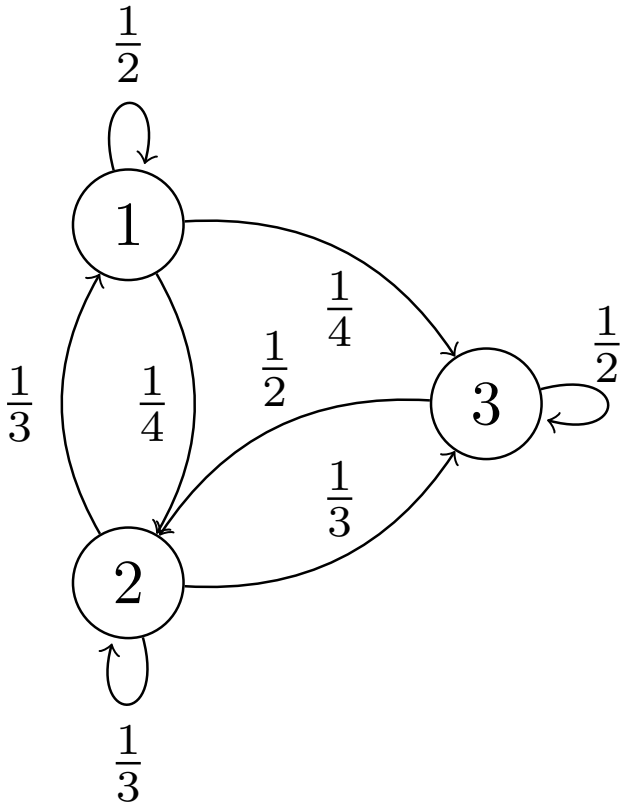


Fig. 0. Markov Chain diagram

$$\begin{pmatrix} p_{11} & p_{12} & p_{13} \\ p_{21} & p_{22} & p_{23} \\ p_{31} & p_{32} & p_{33} \end{pmatrix} \quad (1)$$

$$\Pr(X_2 = 1 | X_1 = 1, X_3 = 2) = \Pr(X_2 = 1 | X_1 = 1) \quad (2)$$

$$= p_{11} \quad (3)$$

$$= 0.5 \quad (4)$$