

Assignment-6

EE22BTECH11012-A.Chhatrapati

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

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

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

$$\Rightarrow \Pr(X_2 = 1 | X_1 = 1) = P_{11} = \frac{1}{2} \quad (3)$$

$$\Rightarrow \Pr(X_2 = 1 | X_1 = 1, X_3 = 2) = \frac{1}{2} = 0.5 \quad (4)$$

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

Solution: Since

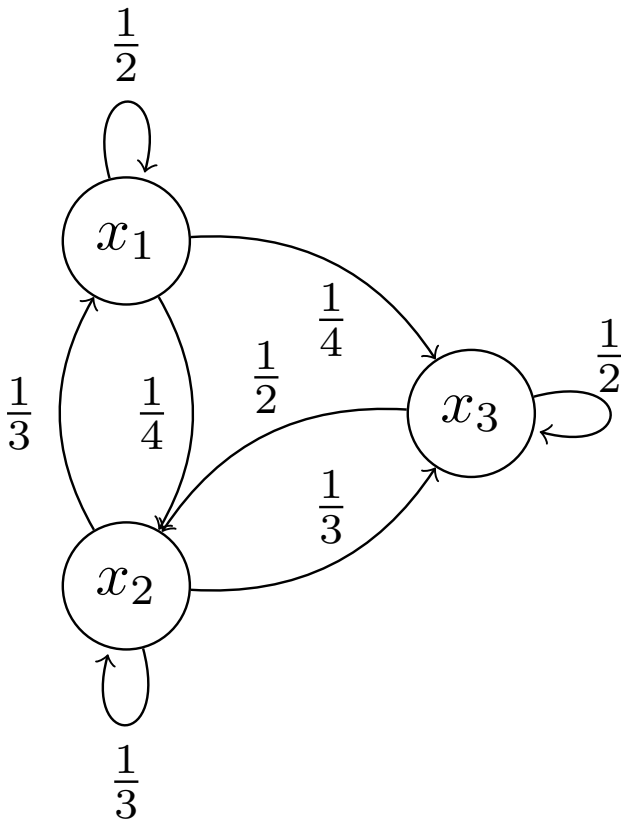


Fig. 0. Markov Chain diagram

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

(by markov's property)

Let's calculate $\Pr(X_2 = 1 | X_1 = 1)$ using transition