

Problem 1

1. A Markov Chain has the transition probability Matrix:

$$\vec{P} = \begin{matrix} & \begin{matrix} 0 & 1 & 2 \end{matrix} \\ \begin{matrix} 0 \\ 1 \\ 2 \end{matrix} & \begin{bmatrix} 0.7 & 0.2 & 0.1 \\ 0 & 0.6 & 0.4 \\ 0.5 & 0 & 0.5 \end{bmatrix} \end{matrix}$$

Calculate:

(i) $P_r \{X_2 = 1, X_3 = 1 \mid X_1 = 0\}$.

(ii) $P_r \{X_1 = 1, X_2 = 1 \mid X_0 = 0\}$.

Problem 2

A Markov Chain $X_0, X_1, X_2 \dots$ has the transition probabilities Matrix:

$$\vec{P} = \begin{matrix} & \begin{matrix} 0 & 1 & 2 \end{matrix} \\ \begin{matrix} 0 \\ 1 \\ 2 \end{matrix} & \begin{bmatrix} 0.3 & 0.2 & 0.5 \\ 0.5 & 0.1 & 0.4 \\ 0.5 & 0.2 & 0.3 \end{bmatrix} \end{matrix}$$

Initial Distribution:

$$p_0 = 0.5 \quad p_1 = 0.5$$

Calculate: (i) $P_r \{X_0 = 1, X_1 = 1, X_2 = 0\}$.

(ii) $P_r \{X_1 = 1, X_2 = 1, X_3 = 0\}$.

Problem 3

A Markov Chain X_n has states 0, 1, 2
transition probability Matrix

$$\vec{P} = \begin{matrix} & \begin{matrix} 0 & 1 & 2 \end{matrix} \\ \begin{matrix} 0 \\ 1 \\ 2 \end{matrix} & \begin{bmatrix} 0.1 & 0.2 & 0.7 \\ 0.2 & 0.2 & 0.6 \\ 0.6 & 0.1 & 0.3 \end{bmatrix} \end{matrix}$$

Calculate:

(i) The 2-step transition matrix P^2 .

(ii) $\Pr \{X_3 = 1 \mid X_1 = 0\}$.

(iii) $\Pr \{X_3 = 1 \mid X_0 = 0\}$.