

The Chinese University of Hong Kong
Department of Mathematics
MMAT 5340 Homework 7
Please submit your assignment online on Blackboard
Due at 18:00 p.m. on Monday, 24th Mar, 2025

1. Consider a Markov chain $X = (X_n)_{n \geq 0}$ with state space $S = \{1, 2, 3, 4\}$ and transition matrix

$$\begin{bmatrix} 0.2 & 0.4 & 0 & 0.4 \\ 0.3 & 0 & 0.7 & 0 \\ 0.5 & 0 & 0.5 & 0 \\ 0 & 0.1 & 0.9 & 0 \end{bmatrix}$$

- (a) Which states are transient and which are recurrent?
(b) Is this markov chain irreducible or reducible?
2. Consider a Markov chain $X = (X_n)_{n \geq 0}$ with state space $S = \{1, 2, 3\}$ and transition matrix

$$\begin{bmatrix} 0.5 & 0 & 0.5 \\ 0 & 1 & 0 \\ 0.4 & 0 & 0.6 \end{bmatrix}$$

- (a) Which states are transient and which are recurrent?
(b) Is this markov chain irreducible or reducible?