تمرین سری اول فرآیندهای تصادفی

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1.

1.8. Consider the following transition matrices. Identify the transient and recurrent states, and the irreducible closed sets in the Markov chains. Give reasons for your answers.

(*a*)

	1	2	3	4	5
1	.4	.3	.3	0	0
2	0	.5	0	.5	0
3	.5	0	.5	0	0
4	0	.5	0	.5	0
5	0	.3	0	.3	.4

(*b*)

	1	2	3	4	5	6
1	.1	0	0	.4	.5	0
2	.1	.2	.2	0	.5	0
3	0	.1	.3	0	0	.6
4	.1	0	0	.9	0	0
5	0	0	0	.4	0	.6
6	0	0	0	0	.5	.5

(*c*)

	1	2	3	4	5
1	0	0	0	0	1
2	0	.2	0	.8	0
3	.1	.2	.4	.3	0
4	0	.4	0	.6	0
5	.2	0	0	0	.8

(*d*)

	1	2	3	4	5	6
1	.8	0	0	.2	0	0
2	0	.5	0	0	.5	0
3	0	0	.3	.4	.1	.2
4	.1	0	0	.9	0	0
5	0	.2	0	0	.8	0
6	0	.3	0	.3	0	.4

(*e*)

	1	2	3	4	5
1	1	0	0	0	0
2	0	2/3	0	1/3	0
3	1/8	1/4	5/8	0	0
4	0	1/6	0	5/6	0
5	1/3	0	1/3	0	1/3

2.

1. Classify the states of the discrete-time Markov chains with state space $S = \{1, 2, 3, 4\}$ and transition matrices

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