Assignment 7

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment. Due on 2018-09-26, 23:59 IST.

1) Consider a DTMC with the state space \( V = \{0, 1, 2, 3\} \) and characterized by the transition probability matrix

\[
P = \begin{bmatrix}
\frac{1}{3} & \frac{1}{3} & 0 & 0 \\
0 & 0 & 1 & 0 \\
1 & 0 & 0 & 0 \\
0 & 0 & \frac{1}{5} & \frac{4}{5}
\end{bmatrix}
\]

Let \( f_{j,n} \) is the probability that the chain eventually returns to state \( j \), given that it is at state \( j \) at \( n = 0 \). Then the value of \( f_{1,1} \) is

- \( \frac{1}{3} \)
- \( \frac{1}{2} \)
- \( \frac{2}{3} \)
- \( 1 \)

No, the answer is incorrect.
Score: 0
Accepted Answers:
1

2) Consider a DTMC with the state space \( V = \{0, 1, 2, 3\} \) and characterized by the transition probability matrix

\[
P = \begin{bmatrix}
\frac{1}{3} & \frac{2}{3} & 0 & 0 \\
0 & 0 & 1 & 0 \\
1 & 0 & 0 & 0 \\
0 & 0 & 1 & 1
\end{bmatrix}
\]

Then the state 3 is

- Periodic
- Transient
- Positive recurrent
- null-recurrent
3) Consider a DTMC with the state space $V = \{0, 1, 2, 3\}$ and characterized by the transition probability matrix

$$P = \begin{bmatrix}
0 & 0.4 & 0.6 & 0 \\
0.3 & 0.5 & 0 & 0.2 \\
0 & 0 & 1 & 0 \\
0 & 0.2 & 1 & 0
\end{bmatrix}$$

The communicating class(es) of the chain is (are)

- $\{0, 2\}$ and $\{1, 3\}$
- $\{0, 1\}$ and $\{2, 3\}$
- $\{1, 2, 3\}$
- $\{0, 1, 2, 3\}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\{0, 1\}$ and $\{2, 3\}$

4) Suppose $\{X_n, n \geq 0\}$ is a DTMC with state space $V = \{0, 1, 2\}$ and the state transition matrix

$$P = \begin{bmatrix}
\frac{1}{2} & \frac{1}{4} & \frac{1}{4} \\
\frac{1}{4} & \frac{1}{2} & \frac{1}{4} \\
0 & \frac{3}{4} & \frac{1}{4}
\end{bmatrix}$$

The probability $P(X_1 = 1, X_2 = 2 | X_0 = 0)$ is equal to

- $\frac{1}{16}$
- $\frac{1}{8}$
- $\frac{1}{4}$
- $\frac{1}{2}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\frac{1}{16}$

5) Suppose $\{X_n, n \geq 0\}$ is a DTMC with state space $V = \{0, 1, 2\}$ and the state transition matrix

$$P = \begin{bmatrix}
\frac{1}{2} & \frac{1}{4} & \frac{1}{4} \\
\frac{1}{4} & \frac{1}{2} & \frac{1}{4} \\
0 & \frac{3}{4} & \frac{1}{4}
\end{bmatrix}$$

If $p_0^{(0)} = P(X_0 = 0) = 1$, then the probability $p_1^{(2)} = P(X_2 = 1)$ is equal to
No, the answer is incorrect.

Score: 0

Accepted Answers:

$\frac{7}{16}$