Started on	Thursday, 24 February 2022, 10:49 AM
State	Finished
Completed on	Thursday, 24 February 2022, 11:03 AM
Time taken	13 mins 36 secs

Question 1

Complete

Marked out of 6.00

Let $\{ X_n , n \geq 1\}$ be a Markov chain with tpm given by P =

	1	2	3	4	5
1	1	0	0	0	0
2	0	3/4	1/4	0	0
3	0	1/8	7/8	0	0
4	1/4	1/4	0	1/8	3/8
5	1/3	0	1/6	1/6	1/3

Find the limiting distribution and answer the following questions:.

Lim n⟶∞ p(2,3)^n [2/3]

Lim n⟶∞ p(4,1)^n [14/25]

Lim n⟶∞ p(5,3)^n [6/25]

Lim n⟶∞ p(5,2)^n [3/25]

Lim n⟶∞ p(3,2)^n [1/3]

Lim n⟶∞ p(4,3)^n [22/75]

Question 2

Complete

Marked out of 3.00

Determine the limiting distribution for the Markov chain with state space S= {0,1,2,3,4} and TPM (P) given by

	0	1	2	3	4
0	1/2	1/2	0	0	0
1	1/2	0	1/2	0	0
2	1/2	0	0	1/2	0
3	1/2	0	0	0	1/2
4	1	0	0	0	0

The value of π_0 is

Select one:

- a. 16/31
- b. 1/8
- c. 5/32
- d. 15/31

Question 3

Complete

Marked out of 3.00

Consider a Markov chain with state-space S={1, 2, 3, 4 } with tpm (P) given by

	1	2	3	4
1	1	0	0	0
2	2/5	0	3/5	0
3	0	0	1	0
4	1/4	1/4	1/4	1/4

Find the probability of absorption to absorbing state 1 from the transient state 4, that is a(4,1). Give your answer in 2 decimal places (round to two decimal places).

Answer: 0.47

Question 4

Complete

Marked out of 3.00

1. Consider a Markov chain with state space S={0,1, 2,3 } with tpm (P) given by

	0	1	2	3
0	0.4	0.3	0.2	0.1
1	0.1	0.4	0.3	0.2
2	0.3	0.2	0.1	0.4
3	0.2	0.1	0.4	0.3

Find the limiting distribution ($\pi_0, \pi_1, \pi_2, \pi_3$). What is the value of π_2

Answer: 0.25

Question 5

Complete

Marked out of 3.00

Let $\{X_n\}$ n = 0,1,2,..... be a sequence of independent and identically distributed discrete random variables with

$P(X_1=k) = (3/4)^k(1/4)$, k=0,1,2,.... .

Let $m_n = \min \{ X_1, X_2, X_3, ..., X_n \}$.

For the Markov chain $\{m_n$, n = 0,1,2,...Obtain the transition probabilities and give the value of

p(2,2).

Answer: 0.5625

Question 6

Complete

Marked out of 3.00

Consider a simple symmetric random walk on {0, 1, 2, 3, ..., k } with reflecting boundaries. If the walk is at state 0, it moves to 1 on the next step. If the walk is at k, it moves to k-1 on the next step. Otherwise, the walk moves to left and right, with a probability 1/2. For k =1000, if the walk starts at 0, how many steps will it take, on average, for the walk to return to state 0?

Answer: 2000

Question 7

Complete

Marked out of 2.00

Consider the matrix **P** of order 3 by 3, given by

$$\begin{matrix} 0 & 1 & 0 \\ 1/4 & 1/2 & 1/4 \\ 1 & 0 & 0 \end{matrix}$$

P is a regular matrix.

Select one:

- True
- False

Question 8

Complete

Marked out of 3.00

Consider a Markov chain with state-space S={1, 2, 3, 4 } with tpm (P) given by

	1	2	3	4
1	1/4	3/4	0	0
2	1/2	1/2	0	0
3	0	0	1/5	4/5
4	0	0	4/5	1/5

Find Lim $n \to \infty P^n$.

Lim n→∞ p(4,3)^n [1/2]

Lim n→∞ p(2,2)^n [3/5]

Lim n→∞ p(3,2)^n [0]

Question 9

Complete

Marked out of 1.00

Let P be a stochastic matrix. If P is regular, the P^2 is also regular. (True/False)

Select one:

- True
- False

Question 10

Complete

Marked out of 1.00

If P be the tpm of the two-state Markov chain

$$\begin{matrix} 0 & 1 \\ 1 & 0 \end{matrix}$$

Then P^2 is tpm of the irreducible Markov chain. (True/False)

Select one:

- True
- False

Question 11

Complete

Marked out of 1.00

Let $\{X_n, n \geq 0\}$ be a Markov chain with tpm P given by

	1	2	3
1	0	1/2	1/2
2	1	0	0
3	1/3	1/3	1/3

Find the value of $P(X_9 = 1 \mid X_1 = 3, X_4 = 1, X_7 = 2)$

Answer: 0

Question 12

Complete

Marked out of 1.00

A gambler has Rs.2. He bets Rs. 1 at time and wins Rs. 1 with probability 1/2 or loses Rs.1 with probability 1/2. He stops playing if he loses Rs. 2 or wins Rs 4. Find the probability that he has lost his money at the end of 2nd play.

Answer: 0.25

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