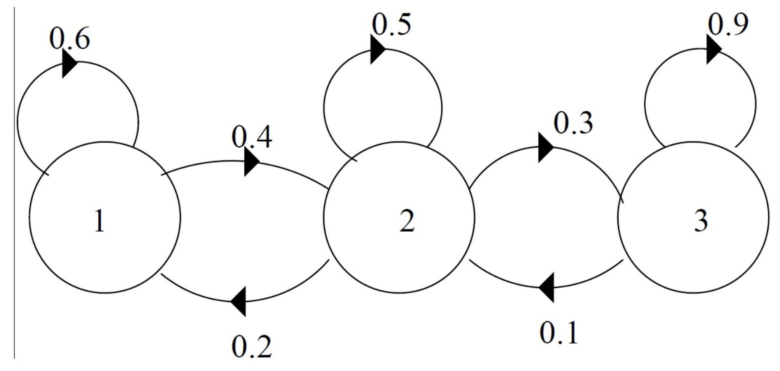
Problem 4: A simple Markov chain

(10/10 points)

Consider a Markov chain $\{X_0, X_1, \ldots\}$, specified by the following transition probability graph.



1. $$\mathbf{P}(X_2 = 2 \mid X_0 = 1) =$$ 0.44

2. Find the steady-state probabilities π_1, π_2, and π_3 associated with states 1, 2, and 3, respectively.

- $\pi_1 =$ 1/9 ✔
- $\pi_2 =$ 2/9 ✔
- $\pi_3 =$ 2/3 ✔

3. For $n = 1, 2, \ldots$, let $Y_n = X_n - X_{n-1}$. Thus, $Y_n = 1$ indicates that the nth transition was to the right, $Y_n = 0$ indicates that it was a self-transition, and $Y_n = -1$ indicates that it was a transition to the left.

$\lim_{n\to\infty} \mathbf{P}(Y_n = 1) =$ 1/9 ✔

4. Is the sequence $Y_1, Y_2, \ldots$ a Markov chain?

No ▼ ✔

5. Given that the nth transition was a transition to the right ($Y_n = 1$), find (approximately) the probability that the state at time $n - 1$ was state 1 (i.e., $X_{n-1} = 1$). Assume that n is large.

Lec. 26: Absorption probabilities and expected time to absorption
Exercises 26 due May 18, 2016 at 23:59 UTC

Solved problems

Problem Set 10
Problem Set 10 due May 18, 2016 at 23:59 UTC

Exit Survey

0.4

6. Suppose that $X_0 = 1$. Let T be the first *positive* time index n at which the state is equal to 1.

$\mathbf{E}[T] =$ 9

7. Does the sequence $X_1, X_2, X_3, \ldots$ converge in probability to a constant?

No

8. Let $Z_n = \max\{X_1, \ldots, X_n\}$. Does the sequence $Z_1, Z_2, Z_3, \ldots$ converge in probability to a constant?

Yes

You have used 2 of 2 submissions

DISCUSSION

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