



Bookmarks

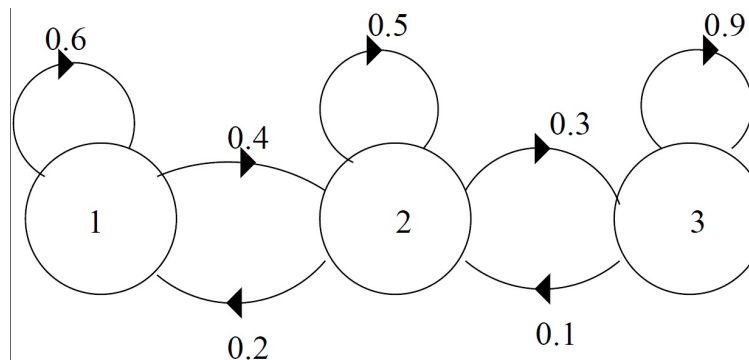
- ▶ Unit 0: Overview
- ▶ Entrance Survey
- ▶ Unit 1: Probability models and axioms
- ▶ Unit 2: Conditioning and independence
- ▶ Unit 3: Counting
- ▶ Unit 4: Discrete random variables
- ▶ Exam 1
- ▶ Unit 5: Continuous random variables

Unit 10: Markov chains > Problem Set 10 > Problem 4 Vertical: A simple Markov chain

Bookmark

Problem 4: A simple Markov chain

(10/10 points)

Consider a Markov chain $\{X_0, X_1, \dots\}$, 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.


- ▶ Unit 6: Further topics on random variables
- ▶ Unit 7: Bayesian inference
- ▶ Exam 2
- ▶ Unit 8: Limit theorems and classical statistics
- ▶ Unit 9: Bernoulli and Poisson processes
- ▼ **Unit 10: Markov chains**

Unit overview

Lec. 24: Finite-state Markov chains

Exercises 24 due May 18, 2016
at 23:59 UTC 

Lec. 25: Steady-state behavior of Markov chains

Exercises 25 due May 18, 2016
at 23:59 UTC 

- $\pi_1 =$ ✓
- $\pi_2 =$ ✓
- $\pi_3 =$ ✓

3. For $n = 1, 2, \dots$, let $Y_n = X_n - X_{n-1}$. Thus, $Y_n = 1$ indicates that the n th 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.


$$\lim_{n \rightarrow \infty} \mathbf{P}(Y_n = 1) =$$
 ✓

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

No ▼ ✓


5. Given that the n th 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



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

 $E[T] =$ 

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



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



You have used 2 of 2 submissions

DISCUSSION

Click "Show Discussion" below to see discussions on this problem.



© edX Inc. All rights reserved except where noted. EdX, Open edX and the edX and Open EdX logos are registered trademarks or trademarks of edX Inc.

