Bookmarks

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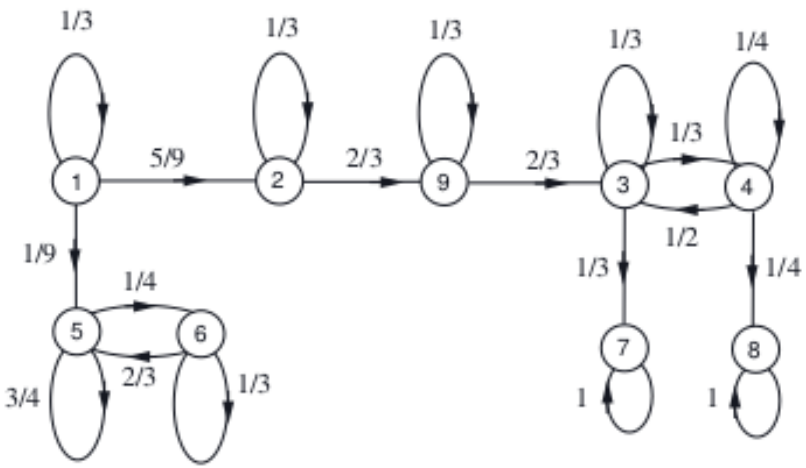
Bookmark

Exercise: Probability of absorption

(2/2 points)

Consider again the Markov chain with the following transition probability graph:



Assuming that the Markov chain is initially in state 2 (i.e., $X_0 = 2$), what is the probability that the chain eventually reaches state 7?

3/4

✔ **Answer:** 0.75

- Unit 6: Further topics on random variables
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- **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

Answer:
Let a_j be the probability that the Markov chain eventually reaches state 7 given that it started in state j. We want to calculate a_2. First note that $a_2 = a_3$ since the chain must eventually go from state 2 to state 9 to state 3 (after some number of self-transitions at states 2 and 9). Now we can write a system of two equations with two unknowns (a_3 and a_4) as follows:

$$a_3 = p_{33}a_3 + p_{34}a_4 + p_{37}a_7 = \frac{1}{3}a_3 + \frac{1}{3}a_4 + \frac{1}{3}\cdot 1$$
$$a_4 = p_{43}a_3 + p_{44}a_4 + p_{48}a_8 = \frac{1}{2}a_3 + \frac{1}{4}a_4 + \frac{1}{4}\cdot 0.$$

Solving, we obtain $a_4 = 1/2$ and $a_2 = a_3 = 3/4$.

You have used 1 of 2 submissions

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


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