



MITx: 6.041x Introduction to Probability - The Science of Uncertainty



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Bookmark

Exercise: n-step recursion

(3/3 points)

Let $r_{ij}(n) = \mathbf{P}(X_n = j \mid X_0 = i)$ be the n -step transition probability of a given homogeneous discrete-time Markov chain with m states. We have shown that $r_{ij}(n)$ satisfies the following recursion for $n \geq 2$: $r_{ij}(n) = \sum_{k=1}^m r_{ik}(n-1)p_{kj}$. For each of the following, decide whether it is also a valid recursion formula for $r_{ij}(n)$.

1.
$$r_{ij}(n) = \sum_{k=1}^m p_{ik} r_{kj}(n-1) \text{ for } n \geq 2$$

Yes ▾



Answer: Yes

2.
$$r_{ij}(n) = \sum_{k=1}^m r_{ik}(n-2) r_{kj}(2) \text{ for } n \geq 3$$

Yes ▾




Answer: Yes

- ▶ 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

3.
$$r_{ij}(n) = \sum_{k=1}^m \sum_{\ell=1}^m r_{ik}(n-2)p_{k\ell}p_{\ell j} \text{ for } n \geq 3$$

Yes ▼




Answer: Yes


Answer:

1. Yes. The recursion considers a one-step transition from i to any state k , followed by an $(n-1)$ -step transition from k to j .
2. Yes. The recursion considers an $(n-2)$ -step transition from i to any state k , followed by a 2-step transition from k to j .
3. Yes. The recursion considers an $(n-2)$ -step transition from i to any state k , followed by a one-step transition from k to any state ℓ , followed by a one-step transition from ℓ to j .

You have used 1 of 1 submissions


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

**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 

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