



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 6: Further topics on random variables

Unit overview

Lec. 11: Derived distributions

Exercises 11 due Mar 30, 2016 at 23:59 UTC

Lec. 12: Sums of independent r.v.'s; Covariance and

Unit 6: Further topics on random variables > Lec. 13: Conditional expectation and variance revisited; Sum of a random number of independent r.v.'s > Lec 13 Conditional expectation and variance revisited Sum of a random number of independent r v s vertical

Bookmark

Exercise: Conditional expectation

(1/1 point)

Let \mathbf{X} and \mathbf{Y} be zero-mean independent random variables. Which one of the following statements is correct? *Hint:* You can take for granted the intuitive fact that $\mathbf{E}[\mathbf{X} \mid \mathbf{X} = x] = x$.

☐ $\mathbf{E}[\mathbf{X} + \mathbf{Y} \mid \mathbf{X}] = 0.$

☐ $\mathbf{E}[\mathbf{X} + \mathbf{Y} \mid \mathbf{X}] = x.$

☒ $\mathbf{E}[\mathbf{X} + \mathbf{Y} \mid \mathbf{X}] = \mathbf{X}. \quad \checkmark$

☐ $\mathbf{E}[\mathbf{X} + \mathbf{Y} \mid \mathbf{X}] = \mathbf{X} + \mathbf{Y}.$

Answer:

Using linearity of expectations, and then the independence assumption, we have

$$\mathbf{E}[\mathbf{X} + \mathbf{Y} \mid \mathbf{X} = x] = \mathbf{E}[\mathbf{X} \mid \mathbf{X} = x] + \mathbf{E}[\mathbf{Y} \mid \mathbf{X} = x] = x + \mathbf{E}[\mathbf{Y}] = x.$$

Translating this statement into abstract notation, we obtain

$$\mathbf{E}[\mathbf{X} + \mathbf{Y} \mid \mathbf{X}] = \mathbf{X}.$$

You have used 1 of 2 submissions

correlation

Exercises 12 due Mar
30, 2016 at 23:59 UTC

**Lec. 13:
Conditional
expectation and
variance revisited;
Sum of a random
number of
independent r.v.'s**

Exercises 13 due Mar
30, 2016 at 23:59 UTC

Solved problems

**Additional
theoretical material**

Problem Set 6

Problem Set 6 due Mar
30, 2016 at 23:59 UTC

Unit summary

© All Rights Reserved



© 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.

POWERED BY
OPENedX

