



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



Bookmarks

- ▶ Unit 0: Overview
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- ▶ Unit 1: Probability models and axioms
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Unit overview

Lec. 8: Probability density functions

Exercises 8 due Mar 16, 2016 at 23:59 UTC

Lec. 9: Conditioning on an event; Multiple r.v.'s

Exercises 9 due Mar 16, 2016 at 23:59 UTC

Unit 5: Continuous random variables > Lec. 10: Conditioning on a random variable; Independence; Bayes' rule > Lec 10 Conditioning on a random variable Independence Bayes rule vertical1



Bookmark

Exercise: Conditional PDFs

(2/2 points)

The random variables X and Y are jointly continuous, with a joint PDF of the form

$$f_{X,Y}(x,y) = \begin{cases} cxy, & \text{if } 0 \leq x \leq y \leq 1, \\ 0, & \text{otherwise,} \end{cases}$$

where c is a normalizing constant.

For $x \in [0, 0.5]$, the conditional PDF $f_{X|Y}(x | 0.5)$ is of the form ax^b . Find a and b . Your answers should be numbers.

 $a =$

8



Answer: 8

 $b =$

1



Answer: 1

Answer:

We have $f_{X|Y}(x | 0.5) = \frac{f_{X,Y}(x, 0.5)}{f_Y(0.5)}$.

Having fixed $y = 0.5$, the conditional PDF is to be viewed as a function of x . For those values of x that are possible (i.e., $x \in [0, 0.5]$), the conditional PDF will be proportional to the joint PDF, hence of the form ax , for some constant a . This implies that $b = 1$. To find the normalizing constant, we use the normalization equation

$$1 = \int_0^{0.5} f_{X|Y}(x | 0.5) dx = \int_0^{0.5} ax dx = a \cdot \frac{x^2}{2} \Big|_0^{0.5} = \frac{a}{8},$$

which yields $a = 8$.

**Lec. 10:
Conditioning on a
random variable;
Independence;
Bayes' rule**

Exercises 10 due Mar
16, 2016 at 23:59 UTC

Standard normal
table

Solved problems

Problem Set 5

Problem Set 5 due Mar
16, 2016 at 23:59 UTC

Unit summary

You have used 2 of 2 submissions

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