



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



Bookmarks

- ▶ Unit 0: Overview
- ▶ Entrance Survey
- ▶ Unit 1: Probability models and axioms
- ▶ Unit 2: Conditioning and independence
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Unit overview

Lec. 8: Probability density functions

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

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

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

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 vertical3



Bookmark

Exercise: Definition of independence

(1/1 point)

Suppose that \mathbf{X} and \mathbf{Y} are independent, with a joint PDF that is uniform on a certain set \mathcal{S} : $f_{\mathbf{X},\mathbf{Y}}(\mathbf{x}, \mathbf{y})$ is constant on \mathcal{S} , and zero otherwise. The set \mathcal{S}

☐ must be a square.

☒ must be a set of the form $\{(\mathbf{x}, \mathbf{y}) : \mathbf{x} \in \mathbf{A}, \mathbf{y} \in \mathbf{B}\}$ (known as the Cartesian product of two sets \mathbf{A} and \mathbf{B}).

☐ can be any set.

Answer:

Let \mathbf{A} be the set of all \mathbf{x} on which $f_{\mathbf{X}}(\mathbf{x})$ is positive and let \mathbf{B} be the set of all \mathbf{y} on which $f_{\mathbf{Y}}(\mathbf{y})$ is positive. Then, the set \mathcal{S} , on which $f_{\mathbf{X},\mathbf{Y}}(\mathbf{x}, \mathbf{y}) = f_{\mathbf{X}}(\mathbf{x})f_{\mathbf{Y}}(\mathbf{y}) > 0$, will be the Cartesian product of \mathbf{A} with \mathbf{B} ; it is not necessarily a square, but it cannot be an arbitrary set.

You have used 2 of 2 submissions

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

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