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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
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Standard normal table

Solved problems

Problem Set 5
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Unit summary



Bookmark

## Exercise: PDFs

(4/4 points)

Let $X$ be a continuous random variable with a PDF of the form

$$f_X(x) = \begin{cases} c(1-x), & \text{if } x \in [0,1], \\ 0, & \text{otherwise.} \end{cases}$$

Find the following values.

1. $c =$ 2 ✔ **Answer:** 2

2. $\mathbf{P}(X = 1/2) =$ 0 ✔ **Answer:** 0

3. $\mathbf{P}\big(X \in \{1/k : k \text{ integer}, k \geq 2\}\big) =$ 0 ✔ **Answer:** 0

4. $\mathbf{P}(X \leq 1/2) =$ 3/4 ✔ **Answer:** 0.75

Answer:

1. We have $1 = \int_{-\infty}^{\infty} f_X(x)\,dx = \int_0^1 c(1-x) = c(x - x^2/2)\Big|_0^1 = c/2,$ and therefore, $c = 2$.

2. Individual points have zero probability.

3. Using countable additivity and the fact that single points have zero probability, we have
$$\mathbf{P}\big(X \in \{1/2, 1/3, 1/4, 1/5, \ldots\}\big) = \sum_{n=2}^{\infty} \mathbf{P}(X = 1/n) = \sum_{n=2}^{\infty} 0 = 0.$$

4. $\mathbf{P}(X \leq 1/2) = \int_{-\infty}^{1/2} f_X(x)\,dx = \int_0^{1/2} 2(1-x)\,dx = 2(x - x^2/2)\Big|_0^{1/2} =$

*You have used 1 of 2 submissions*