

MITx: 14.310x Data Analysis for Social Scientists

Heli

**Bookmarks** 

- Module 1: The Basics of R and Introduction to the Course
- ► Entrance Survey
- Module 2: Fundamentals of Probability, Random Variables, Distributions, and Joint Distributions
- Module 3: Gathering and Collecting Data,
   Ethics, and Kernel Density Estimates
- ▼ Module 4: Joint,
   Marginal, and
   Conditional
   Distributions &
   Functions of Random
   Variable

Module 4: Joint, Marginal, and Conditional Distributions & Functions of Random Variable > Functions of Random Variables: An Example - Quiz

# Functions of Random Variables: An Example - Quiz

☐ Bookmark this page

# **Question 1**

1/1 point (graded)

Let X be a uniform random variable on [0,1] and let  $Y=rac{1}{x}$ .

What is the CDF of  $y, F_y(y)$ ?

- $\circ$  a.  $1-rac{1}{x}$
- 0 b. $\frac{1}{y}$
- o c. **1**
- lacksquare d.  $1-rac{1}{y}$   $\checkmark$
- $\circ$  e.  $\frac{1}{x}$

# <u>Joint, Marginal, and</u> <u>Conditional Distributions</u>

Finger Exercises due Oct 24, 2016 at 05:00 IST

## <u>Functions of Random</u> <u>Variables</u>

Finger Exercises due Oct 24, 2016 at 05:00 IST

#### Module 4: Homework

<u>Homework due Oct 17, 2016 at 05:00 IST</u>

- Module 5: Moments of a Random Variable,
   Applications to Auctions,
   Intro to Regression
- Exit Survey

## **Explanation**

As Professor Ellison demonstrated in lecture, to find the CDF, we start with the definition:

$$F_Y(y)=P(Y\leq y)=P(rac{1}{X}\leq y)=P(X\geq rac{1}{y})=1-rac{1}{y}$$

Submit

(A)

You have used 2 of 2 attempts

✓ Correct (1/1 point)

# Question 2

1/1 point (graded)

Continuing with the same example, for what range of  $m{y}$  is this expression valid?

- $\circ$  a.  $0 \leq y \leq 1$
- $\circ$  b.  $y \leq 1$
- $\circ$  c.  $y \geq 0$
- $\bullet$  d.  $y \geq 1$

## **Explanation**

We know that  $F_Y(y)$  is non-negative. Hence, from the expression obtained in part (1), we have that:

$$F_Y(y)=1-rac{1}{y}\geq 0$$

Solving for y, we find that the expression is valid for  $y \geq 1$ . Otherwise, for  $y < 1, F_Y(y) = 0$ . Note that Professor Ellison referred to this as the "induced support" of Y in lecture.

Submit

You have used 1 of 2 attempts

✓ Correct (1/1 point)

## **Question 3**

1/1 point (graded)

True or False: To find the density of  $m{Y}$ , you need to integrate the expression for the CDF (obtained above) over the appropriate region.

True

● False

<b>Explanation</b> To find the density $f_Y(y)$ from the CDF, you need to differentiate the CDF. Remember, graphically, the CDF is the area under the PDF. So the CDF is obtained by integrating the PDF, and hence to obtain the density from the CDF, you would need to <i>differentiate</i> the CDF,	
Submit You have used 1 of 1 attempts	
✓ Correct (1/1 point)	
Show Discussion	Add A Post

© All Rights Reserved



© 2016 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.

















