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Mid Term due Apr 22, 2020 05:29 IST *Completed*

Problem 3

2.5/2.5 points (graded)

Let X be uniform on $[0, 1/2]$. Find the PDF $f_Y(y)$ of $Y = X/(1-X)$.

For $0 \leq y \leq 1$:

$f_Y(y) =$

2/(y+1)^2

✔ **Answer:** 2/(y+1)^2

$\frac{2}{(y+1)^2}$

STANDARD NOTATION

Solution:

Let $Y = X/(1-X)$. Then, Y takes values in $[0, 1]$. We follow the standard method of finding the CDF of Y, and then differentiating to get the PDF.

$$\begin{aligned} F_Y(y) &= P(Y \leq y) \\ &= \mathbf{P}\left(\frac{X}{1-X} \leq y\right) \\ &= P(X \leq y - Xy) \\ &= P(X(y+1) \leq y) \\ &= \mathbf{P}\left(X \leq \frac{y}{y+1}\right) \end{aligned}$$

$$= F_X\left(\frac{y}{y+1}\right)$$
$$= \frac{2y}{y+1}$$
$$= 2 - \frac{2}{y+1}.$$

Differentiating, we get:

$$f_Y(y) = \begin{cases} \frac{2}{(y+1)^2}, & 0 \le y \le 1, \\ 0, & \text{otherwise.} \end{cases}$$

Submit You have used 2 of 3 attempts

Answers are displayed within the problem

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? Confused how this is simplified 3
This might be a silly question but I'm wondering before differentiation - how do simplify The CDF of Y fro...

loosing 15% for a typo hurts a lot... 3

Monotonic 1

? [STAFF]points for this problem 1
is Problem of 2.5 points OR 3 if 2.5 then total points of all problems is 17.5

? Is it really that simple?

I think i was able to solve this without any calculations. Am i dead wrong?)

2 new 4