

Homework # 9

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Problem 1

Statement

The random variables X and Y have the joint distribution $f_{X,Y}$ given by:

$$f_{X,Y}(x,y) = \begin{cases} \frac{1}{y! \Gamma(\theta) \delta^\theta} x^{y+\theta-1} e^{-x(\frac{1}{\delta}+1)} & \text{if } y = 0, 1, 2, \dots \quad 0 < x < \infty \\ 0 & \text{otherwise} \end{cases}$$

Where: $\delta, \theta > 0$

- Calculate the marginal pdf $f_X(x)$. Identify this distribution and its parameter(s).
 - Calculate the marginal pmf $f_Y(y)$
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Solution

Problem 2

Statement

Find $P(X > \sqrt{Y})$ if X, Y are jointly distributed with pdf:

$$f_{X,Y}(x,y) = x + y \quad 0 \leq x \leq 1, \quad 0 \leq y \leq 1$$

Solution

Problem 3

Statement

Find $P(X^2 < Y < X)$ if X, Y , are jointly distributed with pdf

$$f_{X,Y}(x,y) = 2x \quad 0 \leq x \leq 1, \quad 0 \leq y \leq 1$$

Solution

Problem 4

Statement

A pdf is defined by

$$f_{X,Y}(x,y) = \begin{cases} C(x+2y) & \text{if } 0 < y < 1 \text{ } 0 < x < 2 \\ 0 & \text{otherwise} \end{cases}$$

- a. Find the value of C
 - b. Find the marginal pdf of X
 - c. Find the joint cdf of X and Y
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Solution