

MA395 Takehome Quiz 4

Name:

2) (Problem 3.7.2) Let X and Y be two continuous random variables defined over the unit square with joint pdf

$$f_{X,Y}(x,y) = c \cdot (x^2 + y^2)$$

- a) Find the value of c .
- b) Find the marginal pdfs $f_X(x)$ and $f_Y(y)$.

2) (Problem 3.7.3) Suppose that random variables X and Y vary in accordance with the joint pdf

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

- a) Find c .
- b) Find the marginal pdfs $f_X(x)$ and $f_Y(y)$.

3) (Problem 3.7.8) Consider the experiment of tossing a fair coin three times. Let X denote the number of heads obtained on the last flip, and let Y denote the total number of heads in three flips. Find $f_{X,Y}(x, y)$.

4) (Problem 3.7.12) A point is chosen at random from the interior of the circle whose equation is

$$x^2 + y^2 = 4$$

Let the random variables X and Y be the x -coordinate and y -coordinate, respectively, of the point chosen.

a) Find $f_{X,Y}(x, y)$.

b) Find the marginal pdfs $f_X(x)$ and $f_Y(y)$.

5) Suppose X and Y are random variables with joint pdf $f_{X,Y}(x, y) = x + y$ for X and Y each defined over the unit interval. Find

$$P(X < 2Y)$$

(i.e., find the probability of the event that X is smaller than $2Y$)