

DATA 1010
IN-CLASS EXERCISES
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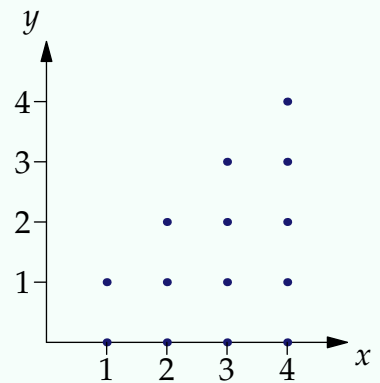
Problem 1

Consider a pair of random variables (X, Y) whose joint distribution is supported on $[0, 1]^2$ with density $6x^2y$. Show that X and Y are independent.

Now suppose the joint density is $\frac{3}{2}(x^2 + y^2)$. Show that X and Y are not independent.

Problem 2

Consider a pair of random variables X and Y with joint distribution m , where m is the probability mass function shown. Find the conditional distribution of Y given $X = x$ for each value of x .



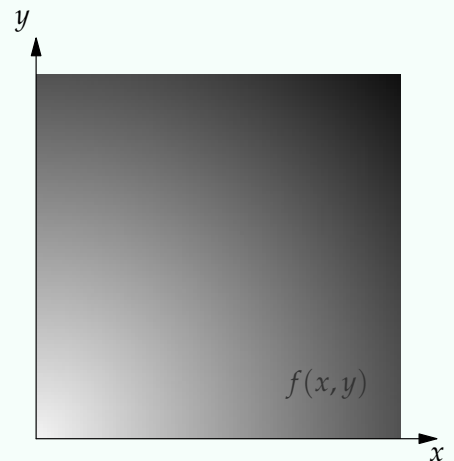
Problem 3

Suppose that f is the function which returns 2 for any point in the triangle with vertices $(0, 0)$, $(1, 0)$, and $(0, 1)$ and otherwise returns 0. If (X, Y) has joint PDF f , find the conditional expectation of Y given $\{X = x\}$.

Problem 4

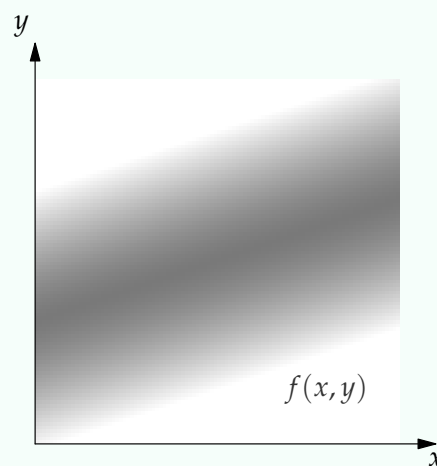
Given that X and Y have joint PDF $f(x, y) = \frac{3}{2}(x^2 + y^2)$ on $[0, 1]^2$, find the conditional expectation of Y given X .

Begin by sketching an estimate of the conditional expectation on the graph shown.



Problem 5

Given that X and Y have joint PDF shown in the figure, sketch an estimate of the conditional expectation of Y given $X = x$.



Problem 6

Given that X and Y have joint PDF $f(x, y) = \frac{9}{5}(1 - \sqrt{xy})$ on $[0, 1]^2$, find the conditional expectation of Y given X .

Begin by sketching an estimate of the conditional expectation on the graph shown.

