
1. Problem 8, p.146. Before doing (a), (b) and (c), first calculate the marginal pdf's of X and Y and the conditional pdf's of X and Y given any value of the other variable. Be sure to indicate for which values of x and y the appropriate conditional pdf's are defined, and specify each marginal for every real number, except for a finite set. Finally, notice that \( f(3/4, 2/3) = 7/5 \). What does this statement signify in terms of the probability of something?

2. Consider the situation of problem 11, p.136, but assume that the person who arrives first will wait no more than \( T \) minutes for the other person. Find this probability as a function of \( T \), then find the time \( T \) for which the probability is exactly \( 1/2 \).

Suggestion: Let \( X \) and \( Y \) be the arrival times of the two people, measured in hours past 5:00 PM. The formal assumptions of the problem are that \( X \) and \( Y \) are independent, and that each has a uniform distribution on \([0, 1]\). It follows that the joint pdf is \( f(x, y) = 1 \) if \( 0 < x < 1 \) and \( 0 < y < 1 \), \( f(x, y) = 0 \) for other \((x, y) \in \mathbb{R}^2\). After working the problem in hour units, restate the results in terms of minutes.

3. Work Problem 7, p.127, but with

\[
Pr(0,0) = .2, \quad Pr(1,0) = .3, \quad Pr(1,1) = .1, \quad Pr(0,1) = .1.
\]

Then the pdf in the interior of square has constant value 0.3. Answer the questions in (a) and (b) and add part (c): Give a formula for \( G(x) = F(x,1), -\infty < x < \infty \), and sketch the graph of \( G \).

4. Problem 2, p.145. Add parts (c) and (d).

(c) If a student is selected at random from the high school, what is the probability that she is a junior who has visited the museum at least once?

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(d) Is year in school independent of museum visit frequency? Why or why not? Follow the method of Example 3.5.5.

To put Problem 4 in our framework, introduce rv’s $X$ and $Y$ to specify year in school and museum frequencies respectively. You can let $X$ take on the values 1, 2, 3, 4 and $Y$ the values 1, 2, 3, with $X = 1$ meaning that the student selected is a freshman, etc.

Recommended problems: Some from DeGroot, sections 3.5 and 3.6. Especially Problems 5, 6, 7 of §3.5 and Problem 9 of §3.6.

Here's another easy problem you should know how to do: Let $X$ and $Y$ be independent rv's, each of which takes on only the two values 0 and 1. Suppose that their joint p.f. satisfies $f(0, 0) = 1/2$ and $f(1, 0) = 1/4$. Find $f(0, 1)$, $f(1, 1)$, and the p.f.'s of $X$ and $Y$. 