15. Exercise: Expected value rule

Exercises due Feb 28, 2020 05:29 IST *Completed*

Exercise: Expected value rule

4/6 points (graded)

Let X and Y be discrete random variables. For each one of the formulas below, state whether it is true or false.

a) $\mathbf{E}\left[X^2\right] = \sum_x x p_X\left(x^2\right)$

False ✔ **Answer:** False

b) $\mathbf{E}\left[X^2\right] = \sum_x x^2 p_X\left(x\right)$

True ✔ **Answer:** True

c) $\mathbf{E}\left[X^2\right] = \sum_x x^2 p_{X,Y}\left(x\right)$

False ✔ **Answer:** False

d) $\mathbf{E}\left[X^2\right] = \sum_x x^2 p_{X,Y}\left(x,y\right)$

True ✖ **Answer:** False

e) $\mathbf{E}\left[X^2\right] = \sum_x \sum_y x^2 p_{X,Y}\left(x,y\right)$

True ✔ **Answer:** True

f) $\mathbf{E}\left[X^2\right] = \sum_z z p_{X^2}\left(z\right)$

False ✖ **Answer:** True

Solution:

a) False. This does not follow from any of our formulas.

b) True. This is the expected value rule for a function of a single random variable.

c) False. This is syntactically wrong since the function $p_{X,Y}$ needs two arguments.

d) False. The left-hand side is a number whereas the right-hand side is actually a function of y .

e) True. This is the expected value rule

$$\mathbf{E}\left[g\left(X,Y\right)\right]=\sum_{x}\sum_{y}g\left(x,y\right)p_{X,Y}\left(x,y\right),$$

for the function $g\left(x,y\right)=x^{2}$.

f) True. This is just the definition of the expectation $\mathbf{E}\left[Z\right]=\sum_{z}zp_{Z}\left(z\right)$, where Z is the random variable X^{2}.

Submit You have used 1 of 1 attempt

Answers are displayed within the problem

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part f) is confusing
Z in part f) is just given without context. Of course I can define it as the way the answer shows but what i... 8 new

? (e)
Kindly explain the function g(x,y)=x^2. f(x)=x^2 is understood , where y varies as x^2 for all values of x - it... 3

? (d)

As mentioned in the answer (d) , E[g(X,Y)] is a no. for all x,y's.. But in this case, how it becomes a function ...

💬	On (d)	4
💬	These aren't trick questions, they're straight out of the book Review your "Expected Value Rule for Functions of Random Variables" as well as your "Summary of Facts...	2
💬	Very confusing excercise I greatly enjoy the course. However, I found this exercise a bit pointless and misleading. The False answe...	6
?	Part f)? Could someone provide a hint on part F)?	14
💬	[STAFF] Is it OK to add syntactical errors to questions? I think it is bit weird. I noticed that something is strange in notation, but I don't expect syntactical error i...	13
?	out of curiosity... ...did the prof or the CTAs come up with this one?	2
?	part c If Y were a constant, do you need a specific y to describe it's PMF?	3
💬	Trick question? Are random variables X and Y associated with the same experiment? Question doesn't say so. Nor does i...	5
💬	Hint: Fist watch first half of next video In first part of the next video, he uses these expressions so it might help to understand. Also, think z as h...	1