



15. Exercise: Independent normals

Exercises due Mar 13, 2020 05:29 IST Completed

Exercise: Independent normals

4/4 points (graded)

The random variables X and Y have a joint PDF of the form

$$f_{X,Y}(x, y) = c \cdot \exp \left\{ -\frac{1}{2} (4x^2 - 8x + y^2 - 6y + 13) \right\}.$$

$\mathbf{E}[X] =$ ✓ Answer: 1

$\text{Var}(X) =$ ✓ Answer: 0.25

$\mathbf{E}[Y] =$ ✓ Answer: 3

$\text{Var}(Y) =$ ✓ Answer: 1

Solution:

We rewrite the joint PDF in the form

$$f_{X,Y}(x, y) = c \cdot \exp \left\{ -\frac{1}{2} \left(\frac{(x-1)^2}{1/4} + (y-3)^2 \right) \right\},$$



and we recognize that we are dealing with the joint PDF of two independent normals with $\mathbf{E}[X] = 1$, $\mathbf{Var}(X) = 1/4$, $\mathbf{E}[Y] = 3$, and $\mathbf{Var}(Y) = 1$.

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You have used 1 of 3 attempts

i Answers are displayed within the problem

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Neither of the az^2+bz+c factors cleanly into the desired form. Why are we able to rewrite the joint PDF in the form given in the solution?

4 new_

As I asked in the title, neither of these groups factors cleanly into the desired form. I'm wondering why w...

HOW are we supposed to get there??

I feel like through the units, the answers to the exercises are more and more often shortened and not v...

1

Confused with $\text{Exp}\{\}$ Operator

What does the $\text{exp}\{\}$ operator do to this equation? Can this be written in a format more familiar to stand...

2

Confused about $\text{Var}(X)$

I don't quite see how the answer for the $\text{Var}(x)$ was arrived at. I am sure I am making a stupid algebra err...

2 new_

Wolfram alpha comes in handy here

Wolfram alpha is very useful to get to the alternate form we need. But it took me a long time to get there...

1

Is the solution unique?

How to prove the solution is unique? We can write $f_{\{X,Y\}}(x,y) = f_{\{X\}}(x)f_{\{Y\}}(y)$, but we can also write $f_{\{X,...$

4

Are X and Y independent normals?

Does the exercise assume that X and Y are independent normals or could they be any two random varia...

8

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