5. Exercise: Conditional probabilities in a continuous model

Exercises due Feb 12, 2020 05:29 IST *Completed*

Exercise: Conditional probabilities in a continuous model

2.0/2.0 points (graded)

Let the sample space be the unit square, $\Omega = [0,1]^2$, and let the probability of a set be the area of the set. Let A be the set of points $(x,y) \in [0,1]^2$ for which $y \leq x$. Let B be the set of points for which $x \leq 1/2$. Find $\mathbf{P}(A \mid B)$.

$\mathbf{P}(A \mid B) =$ 0.25 ✔ **Answer:** 0.25

Solution:

We observe that the area of the set B is $1/2$, so that $\mathbf{P}(B) = 1/2$. Furthermore, the set $A \cap B$ is the triangle with vertices at $(0,0)$, $(1/2,0)$, $(1/2,1/2)$. The area of that triangle is $1/8$, so that $\mathbf{P}(A \cap B) = 1/8$. Therefore,

$$\mathbf{P}(A \mid B) = \frac{\mathbf{P}(A \cap B)}{\mathbf{P}(B)} = \frac{1/8}{1/2} = \frac{1}{4}.$$

Submit You have used 3 of 3 attempts

Answers are displayed within the problem

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model

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Sample space not clear to me — 10 new
I don't understand the power of 2 next to the sample space, is **Ω=[0,1]^2** the same as **Ω=[0,1]** ?...

clear diagram for understanding — 3

Triangle — 2
Sorry, its a very obvious question but I m back to school at 41 , I m having troubles to diagram the triangl...

Hint: this is the correct visualization — 1

? Why the area of triangle for A∩B is 1/8? — 4
I am not able to find the answer. Please some one explain me the concept.

Got correct on second attempt after visualizing properly. its easy if you plot correct figure. — 1
If you draw proper figure , its much easy , i think test is on our visualization, Visualizing rectangle was to...

Hint — 4 new — 10
The conditional probability formula may come in handy here.

? why AintersectionB is a triangle? why didnt we consider (0,1/2) vertex? — 3
Can someone please share why AintersectionB is a triangle? why didnt we consider (0,1/2) vertex? I'm co...