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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 $\mathbf{P}(A\mid B)$.

$$\mathbf{P}\left(A\mid B\right) = \boxed{0.25}$$

✓ Answer: 0.25

Solution:

We observe that the area of the set B is 1/2, so that ${\bf P}(B)=1/2$. 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 ${\bf P}(A\cap B)=1/8$. Therefore,

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

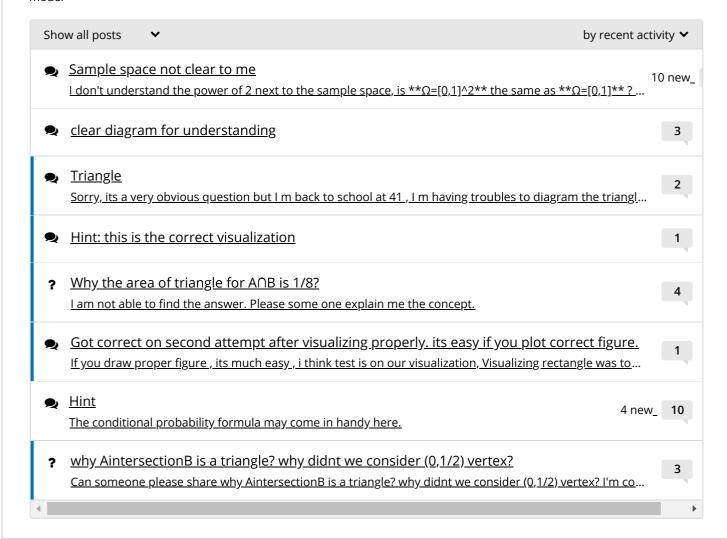
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1 Answers are displayed within the problem

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