



MITx: 6.041x Introduction to Probability - The Science of Uncertainty



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Unit overview

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Conditioning and Bayes rule vertical1

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**EXERCISE: CONDITIONAL PROBABILITIES IN A
CONTINUOUS MODEL**

(2/2 points)

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 $P(A \mid B)$.

 $P(A \mid B) =$ **Answer: 0.25**

Answer:

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

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

You have used 1 of 2 submissions

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