



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



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Lec. 1: Probability models and axioms

Exercises 1 due Feb 10, 2016 at 23:59 UTC

Mathematical background: Sets; sequences, limits, and series; (un)countable sets.

Solved problems
Problem Set 1

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EXERCISE: SIMPLE PROPERTIES (4/4 points)

Let A , B , and C be disjoint subsets of the sample space. For each one of the following statements, determine whether it is true or false. *Note:* "False" means "not guaranteed to be true."

a) $\mathbf{P}(A) + \mathbf{P}(A^c) + \mathbf{P}(B) = \mathbf{P}(A \cup A^c \cup B)$

False ▾



Answer: False

b) $\mathbf{P}(A) + \mathbf{P}(B) \leq 1$

True ▾



Answer: True

c) $\mathbf{P}(A^c) + \mathbf{P}(B) \leq 1$

False ▾



Answer: False

d) $\mathbf{P}(A \cup B \cup C) \geq \mathbf{P}(A \cup B)$

True ▾



Answer: True

Answer:

a) False. For a counterexample, let $A = \emptyset$, $B = \Omega$, and $C = \emptyset$. In that case, the left-hand side of the equation equals 2, whereas the right-hand side equals 1.

b) True. Since A and B are disjoint, we have
 $\mathbf{P}(A) + \mathbf{P}(B) = \mathbf{P}(A \cup B) \leq 1$

c) False. For a counterexample, let $A = \emptyset$, $B = \Omega$, and $C = \emptyset$. In that case, $\mathbf{P}(A^c) + \mathbf{P}(B) = 2$.

d) True. Since A , B , and C are disjoint, we have
 $\mathbf{P}(A \cup B \cup C) = \mathbf{P}(A) + \mathbf{P}(B) + \mathbf{P}(C) \geq \mathbf{P}(A) + \mathbf{P}(B) = \mathbf{P}(A \cup B)$.

You have used 1 of 1 submissions

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