



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



Bookmarks

- ▶ Unit 0: Overview
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- ▶ Unit 1: Probability models and axioms
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## Unit overview

**Lec. 2:**  
 Conditioning and Bayes' rule

Exercises 2 due Feb 17, 2016 at 23:59 UT

**Lec. 3:**  
 Independence

Exercises 3 due Feb 17, 2016 at 23:59 UT

## Solved problems

## Problem Set 2

Problem Set 2 due Feb 17, 2016 at 23:59 UT

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Bookmark

## EXERCISE: INDEPENDENCE OF EVENT COMPLEMENTS

(1/1 point)

Suppose that  $A$  and  $B$  are independent events. Are  $A^c$  and  $B^c$  independent?



Answer: Yes, they are independent

Answer:

We saw in the previous segment that for any 2 generic events  $E_1$  and  $E_2$ , independence of  $E_1$  and  $E_2$  implies independence of  $E_1$  and  $E_2^c$ . In the case of this particular problem, we can apply this result with  $E_1 = A$  and  $E_2 = B$  to conclude that since  $A$  and  $B$  are assumed to be independent, then  $A$  and  $B^c$  are also independent.

Independence is symmetric, so  $A$  and  $B^c$  being independent is the same as  $B^c$  and  $A$  being independent. If we now reuse the generic result with  $E_1 = B^c$  and  $E_2 = A$  we can conclude that  $B^c$  and  $A^c$  are also independent, which by symmetry is the same as  $A^c$  and  $B^c$  being independent.

To summarize:

$$A \text{ and } B \text{ independent} \Rightarrow A \text{ and } B^c \text{ independent} \Rightarrow B^c \text{ and } A \text{ independent} \Rightarrow B^c \text{ and } A^c \text{ independent} \Rightarrow A^c \text{ and } B^c \text{ independent}$$
*You have used 1 of 1 submissions*

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