8. Exercise: Independence of event complements

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

Exercise: Independence of event complements

1/1 point (graded)

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

| Yes, they are independent ∨ | ✔ **Answer:** Yes, they are independent

Solution:

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 and B independent $\Rightarrow$ A and B^c independent $\Rightarrow$ B^c and A independent $\Rightarrow$ B^c and A^c independent $\Rightarrow$ A^c and B^c independent

| Submit | You have used 1 of 1 attempt

ⓘ   Answers are displayed within the problem

Discussion

Topic: Unit 2: Conditioning and independence:Lec. 3: Independence / 8.
Exercise: Independence of event complements

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💬 **Mathematics proof**
[Edited to remove answer]   6

💬 **For those with less intuition (like me)**   5

❓ **Isn't it the intersection of two complementary events the empty set?**
I got very confused with the answer of this problem considering that the intersection of two complemen…   7

☑ **Is it correct to assume that a union of the complement events is 1 - intersection of the events?**   6

❓ **I got the correct answer based on intuition but can someone explain the math?**
The intuition is simple but I doubted myself and tried deriving a mathematical formula from a Venn diag…   7