Exercise: Independence of multiple events

(1/2 points)

Suppose that A, B, C, and D are independent. Use intuitive reasoning (not a mathematical proof) to answer the following.

1. Is it guaranteed that $A \cap C$ is independent from $B^c \cap D$?

   No ✖ **Answer:** Yes

2. Is it guaranteed that $A \cap B^c \cap D$ is independent from $B^c \cup D^c$?

   No ✔ **Answer:** No

Answer:

1. The occurrence of event $A \cap C$ contains information about A and C, but provides no information on the occurrence of B, D, or for that matter, $B^c \cap D$. Hence we have independence.

2. Event D influences both of the events $A \cap B^c \cap D$ and $B^c \cup D^c$, and therefore introduces a dependence between them. For a more concrete argument, if we are told that event $A \cap B^c \cap D$ occurs, then we know that D occurred. Therefore, D^c did not occur, and this generally reduces the probability of event $B^c \cup D^c$.

You have used 1 of 1 submissions

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