9. Exercise: The multiplication rule

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

Exercise: The multiplication rule

4/4 points (graded)

Are the following statements true or false? (Assume that all conditioning events have positive probability.)

1. $\mathbf{P}\left(A \cap B \cap C^c\right) = \mathbf{P}\left(A \cap B\right)\, \mathbf{P}\left(C^c \mid A \cap B\right)$

   True ✔ **Answer:** True

2. $\mathbf{P}\left(A \cap B \cap C^c\right) = \mathbf{P}\left(A\right)\, \mathbf{P}\left(C^c \mid A\right)\, \mathbf{P}\left(B \mid A \cap C^c\right)$

   True ✔ **Answer:** True

3. $\mathbf{P}\left(A \cap B \cap C^c\right) = \mathbf{P}\left(A\right)\, \mathbf{P}\left(C^c \cap A \mid A\right)\, \mathbf{P}\left(B \mid A \cap C^c\right)$

   True ✔ **Answer:** True

4. $\mathbf{P}\left(A \cap B \mid C\right) = \mathbf{P}\left(A \mid C\right)\, \mathbf{P}\left(B \mid A \cap C\right)$

   True ✔ **Answer:** True

Solution:

1. True. This is the usual multipication rule applied to the two events $A \cap B$ and C^c.

2. True. This is the usual multiplication rule.

3. True. This is because

$$\mathbf{P}\left(C^c \cap A \mid A\right) = \frac{\mathbf{P}\left(C^c \cap A \cap A\right)}{\mathbf{P}\left(A\right)} = \frac{\mathbf{P}\left(C^c \cap A\right)}{\mathbf{P}\left(A\right)} = \mathbf{P}\left(C^c \mid A\right).$$

So, this statement is equivalent to the one in part 2.

4. True. This is the usual multiplication rule $\mathbf{P}\left(A \cap B\right) = \mathbf{P}\left(A\right)\mathbf{P}\left(B \mid A\right)$, applied to a model/universe in which event C is known to have occurred.

Submit You have used 1 of 1 attempt

Answers are displayed within the problem

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? P(A∩B|C)=P(A|C)P(B|A∩C) - How to prove this true or false? 16
I was unable to understand the answer to the 4th exercise. Could someone explain how it was derived?

? "~ | C" seems to be not a WFF 2
I can see that, by expanding both sides, you get an expression that is a fraction and that has a term on b...

? Is my approach correct? 1
I got these all right, but not sure if I approached it correctly, as I didn't understand the answers provided ...

Get wrong question 3 2
I got wrong question 3 because I thought that P(C^c∩A|A) = 1, Now I understand why it is not true.

That 3rd one what a dirty trick 19 new 25
come on, that one is just to make you fail.

Don't understand solution for #4 2
By starting with RHS, and converting it to P(A intersect B intersect C)/ P(C), the multiplication rule follows...

? is it a concept or a mathematical way ? 2
i have solved them , but is it okay if i don't get them by concept ? , i mean i got them by exchanging one r...