1.

Mid Term due Mar 4, 2020 05:29 IST *Completed*

True or False

3/4 points (graded)

Let A, B, and C be events associated with the same probabilistic model (i.e., subsets of a common sample space), and assume that $P(C) > 0$.

For each one of the following statements, decide whether the statement is True (always true), or False (not always true).

1. Suppose that $A \subset C$. Then, $P(A \mid C) \geq P(A)$.

- ◯ True ✔
- ◉ False

✖

2. Suppose that $A \subset B$. Then, $P(A \mid C) \leq P(B \mid C)$.

- ◉ True
- ◯ False

✔

3. Suppose that $P(A) \leq P(B)$. Then, $P(A \mid C) \leq P(B \mid C)$.

- ◯ True

- (●) False

✔

4. Suppose that $A \subset C$, $B \subset C$, and $P(A) \leq P(B)$. Then, $P(A \mid C) \leq P(B \mid C)$.

- (●) True
- ( ) False

✔

Solution:

1. Suppose that $A \subset C$. Then, $P(A \mid C) \geq P(A)$. This is **TRUE**:

$$P(A \mid C) = \frac{P(A \cap C)}{P(C)} = \frac{P(A)}{P(C)} \geq P(A), \tag{7.1}$$

since $P(C) \leq 1$.

2. Suppose that $A \subset B$. Then, $P(A \mid C) \leq P(B \mid C)$. This is **TRUE**.

$$P(A \mid C) = \frac{P(A \cap C)}{P(C)} \leq \frac{P(B \cap C)}{P(C)} = P(B \mid C)$$

where the inequality follows from $A \cap C \subset B \cap C$.

3. Suppose that $P(A) \leq P(B)$. Then, $P(A \mid C) \leq P(B \mid C)$.This is **FALSE**, with the following counter example:
Suppose that A and B are disjoint events with positive probability and that $C = A$. Then, $P(A \mid C) = P(A) > 0$, whereas $P(B \mid C) = 0$.

4. Suppose that $A \subset C$, $B \subset C$, and $P(A) \leq P(B)$. Then, $P(A \mid C) \leq P(B \mid C)$. This is **TRUE**:
Since $A, B \subset C$, we have $P(A \mid C) = \frac{P(A)}{P(C)}$ and similarly $P(B \mid C) = \frac{P(B)}{P(C)}$.
Then, $P(A) \leq P(B)$ implies $P(A \mid C) \leq P(B \mid C)$.

Submit You have used 2 of 3 attempts

Answers are displayed within the problem

Error and Bug Reports/Technical Issues

Hide Discussion

Topic: Exam 1:Exam 1 / 1.

Show all posts by recent activity

? Question 2, what if B∩C = ∅, A∩C ≠∅ ? 2
I was thinking if B∩C = ∅, A∩C ≠∅, then, $P(A|C) \geq P(B|C)$. Can anyone explain why my logic is not valid?

[Staff] 3
The progress bar is gone and there are no answers for this exam. Is this supposed to be this way?

So sad moment 2
I hit the submit button accidentally, after I tried the first only question. May be a lesson for the rest of m...

Please check the answers again 1
Please check the answers again, I think my all answers are correct. There is some error

My answers to Q1 1 new
Here are my answers to Q1(I hope that I am not violating honor code since exam deadline has passed) 1....

BUG? Lots of [mathjaxinline] 2
I'm seeing lots of these words: [mathjaxinline], it appears literally as "mathjaxinline" in square brackets, ...

? Does the ⊂ symbol imply proper subset or a subset? 2
Looking for clarification on the symbol

No green checks or red marks....is this ok? 2
this is my first exam...and I just submitted question 1 and nothing happened...no green checks or red m...

? Where's the exam? 2
This's the first time I have taken an exam on edx. It turns out that I can't find the exam web page. Is ther...

Oh, accidentally started the exam ahead of time :) 2
Will be learning along the way now..)

Layout of Exam 2
Will the Exam give us a layout that cues which unit to focus on to answer a question? Or is it all mixed up?

Do the assumptions of the preceding questions still hold for the next or do we start

from sratch?

[Deleted] - SergK

1 new 6