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## 6. Exercise: Independence of two events - III

Exercises due Feb 12, 2020 05:29 IST Completed

### Exercise: Independence of two events - III

2.0/2.0 points (graded)

When is an event  $A$  independent of itself?

Choose one of the following possible answers:

☐ Always

☐ If and only if  $\mathbf{P}(A) = 0$

☐ If and only if  $\mathbf{P}(A) = 1$

☒ If and only if  $\mathbf{P}(A)$  is either 0 or 1



#### Solution:

Using the definition,  $A$  is independent of itself if and only if

$$\mathbf{P}(A \cap A) = \mathbf{P}(A) \cdot \mathbf{P}(A).$$

Since  $A \cap A = A$ , we have  $\mathbf{P}(A \cap A) = \mathbf{P}(A)$  and we obtain the equivalent condition



$$\mathbf{P}(A) = \mathbf{P}(A) \cdot \mathbf{P}(A),$$

or

$$\mathbf{P}(A) \cdot (1 - \mathbf{P}(A)) = 0,$$

and this happens if and only if  $\mathbf{P}(A)$  is either 0 or 1.

Submit

You have used 1 of 2 attempts

**i** Answers are displayed within the problem

## Discussion

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Exercise: Independence of two events - III

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intuitive meaning of question

3 new\_ 18

i solved this question mathematically but am struggling to understand intuitively what the result means



in the lecture we had the caveat that  $p(a) \leq 0$

5



General case for 2 events

1 new\_ 7

Suppose we have events A and B where  $P(A) = 0$  or  $P(A) = 1$ . Are A and B independent?



(Possible Spoilers for the question) The non formal definition for independence

3

If two events are independent, then given that one event has occurred, the probability of the other is un...



Interesting algebra hint

1

This is an interesting thing about algebra I discovered while doing this exercise: If you have an equation ...



Why are people saying  $P(A) = 0$  ?

3

Is this necessarily a continuous situation, where a point has probability 0? What if event is a subset, with ...

