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## 8. Exercise: Indicator variables

Exercises due Feb 28, 2020 05:29 IST Completed

Exercise: Indicator variables

2/2 points (graded)

Let A and B be two events (subsets of the same sample space  $\Omega$ ), with nonempty intersection. Let  $I_A$  and  $I_B$  be the associated indicator random variables.

For each of the two cases below, select one statement that is true.

a) 
$$I_A + I_B$$
:

is not the indicator random variable of any event 🗸 🗸

Answer: is not the indicator random variable of any event

b)  $I_A \cdot I_B$ :

is the indicator variable of the event A∩B ✓

**Answer:** is the indicator variable of the event  $A\cap B$ 

(Bug warning: In some browsers, the mathematical content in each choice in the dropdown menu may appear duplicated, e.g.  $A\cup B$  may show up twice as  $A\cup BA\cup B$ . )

## **Solution:**

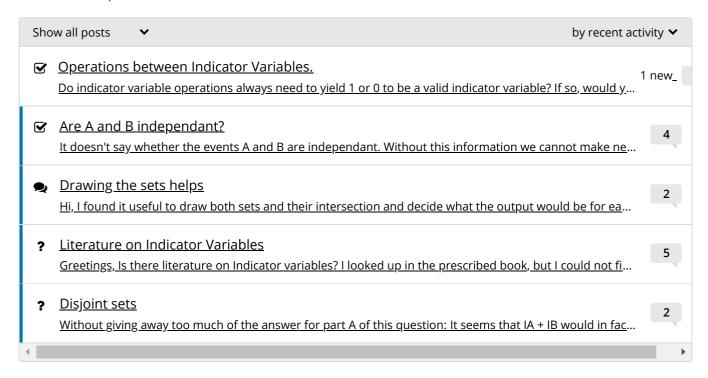
- a) If the outcome of the experiment lies in the intersection of the events A and B, then  $I_A+I_B$  takes the value of 2. But indicator random variables can take only the values 0 or 1. Therefore,  $I_A+I_B$  is not an indicator random variable.
- b) Note that  $I_A \cdot I_B$  can take only the values 0 or 1. It is equal to 1 if and only if  $I_A=1$  (i.e., event A occurs) and  $I_B=1$  (i.e., event B occurs). Thus,  $I_A \cdot I_B$  takes the value of 1 if and only if both A and B occur, and so it is the indicator random variable of the event  $A \cap B$

**1** Answers are displayed within the problem

## Discussion

**Hide Discussion** 

**Topic:** Unit 4: Discrete random variables:Lec. 5: Probability mass functions and expectations / 8. Exercise: Indicator variables



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