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5.

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

Variance of Difference of Indicators

0.0/2.0 points (graded)

Let A be an event, and let I_A be the associated indicator random variable (I_A is 1 if A occurs, and zero if A does not occur). Similarly, let I_B be the indicator of another event, B. Suppose that P(A)=p, P(B)=q, and $P(A\cap B)=r$.

Find the variance of I_A-I_B , in terms of p, q, r.

$$\mathsf{Var}\left(I_A - I_B
ight) =$$

×

Answer: p-2*r+q-(p-q)^2

$$p\cdot q\cdot (1-p)\cdot (1+q)-4\cdot r$$

STANDARD NOTATION

Solution:

$$\begin{aligned} \operatorname{Var}\left(I_{A}-I_{B}\right) &= \mathbf{E}\left[\left(I_{A}-I_{B}\right)^{2}\right] - \left(\mathbf{E}\left[\left(I_{A}-I_{B}\right)\right]\right)^{2} \\ &= \mathbf{E}\left[I_{A}^{2}-2I_{A}I_{B}+I_{B}^{2}\right] - \left(\mathbf{E}\left[I_{A}\right]-\mathbf{E}\left[I_{B}\right]\right)^{2} \\ &= \mathbf{E}\left[I_{A}^{2}\right] - 2\mathbf{E}\left[I_{A}I_{B}\right] + \mathbf{E}\left[I_{B}^{2}\right] - \left(\mathbf{E}\left[I_{A}\right]\right) - \left(\mathbf{E}\left[I_{B}\right]\right)^{2} \\ &= \mathbf{E}\left[I_{A}\right] - 2\mathbf{E}\left[I_{A}I_{B}\right] + \mathbf{E}\left[I_{B}\right] - \left(\mathbf{E}\left[I_{A}\right]\right) - \left(\mathbf{E}\left[I_{B}\right]\right)^{2} \\ &= P\left(A\right) - 2P\left(A\cap B\right) + P\left(B\right) - \left(P\left(A\right) - P\left(B\right)\right)^{2} \\ &= p - 2r + q - \left(p - q\right)^{2} \end{aligned}$$

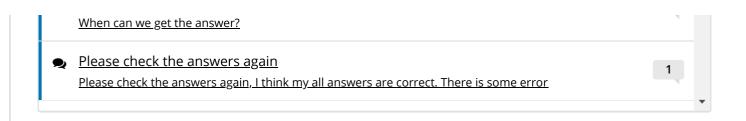
1 Answers are displayed within the problem

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? Is there a set of parentheses missing in lines 3 and 4 of the solution? Not that I expect anyone to see this ever, but I'm looking over my previous mistakes, and trying to	o un
My appraoch to Q5, please help to spot my error first I identify possible outcomes of IA-IB: (IA-IB) ^2 =0 if Both A and B do not happen i.e. (0-0) OF	8 Bot 4
? How does E[IA*IB] becomes A intersect B if they are not independent? From my understanding, if IA and IB are not independent then E [IA*IB] should be P(A) P(B A) where the property is a second of the property is a second of the property independent that is a second of the property is a second of the proper	<u>ich i</u>
☑ STAFF: Q5 Answer is right Answer for question 5 is correct, just expanded (p-q)^2. Can you please review? Thank you in adv Answer for question 5 is correct, just expanded (p-q)^2. Can you please review? Thank you in adv Answer for question 5 is correct, just expanded (p-q)^2. Can you please review? Thank you in adv Answer for question 5 is correct, just expanded (p-q)^2. Can you please review? Thank you in adv Answer for question 5 is correct, just expanded (p-q)^2. Can you please review? Thank you in adv Answer for question 5 is correct, just expanded (p-q)^2. Can you please review? Thank you in adv Answer for question 5 is correct, just expanded (p-q)^2. Can you please review? Thank you in adv Answer for question 5 is correct, just expanded (p-q)^2. Can you please review? Thank you in adv Answer for question 5 is correct, just expanded (p-q)^2. Answer for question 5 is correct, just expanded (p-q)^4. Answer for question 5 is correct, just expanded (p-q)^6. Answer for question 6 is questio	ance.
? [Staff] The progress show my answer is incorrect. I simplified the answer. Please che this can be given the mark:) [Staff]. The progress show my answer is incorrect. I simplified the answer. Please check if this can	7
? [STAFF] Incorrect Gradding Pls Fix my mark Hello Staff, I have the same correct answer but yours is factorized that all. Pls expand the parenth	nesis
Points. Could this be reviewed, please? This question is for staff:) For the Var(IA-IB) I obtained the write answer but decided to do the order.	4
STAFF: My answer for number 5 on the Exam was marked incorrect and it is correct based on the answer Could you check on this for me please.	3
My answer to Q5	14 new_ 23
!s this not correct? !just want to confirm, based off of the discussions, it seems like the answer is p + q - 2*r - (p - q)^	2 s
? When can we get the answer?	



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