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10. Exercise: Lightbulb burnouts

Exercises due May 13, 2020 05:29 IST Completed

Exercise: Lightbulb burnouts

0/1 point (graded)

As in the preceding video, consider three lightbulbs each of which has a lifetime that is an independent exponential random variable with parameter $\lambda=1$. The variance of the time until all three burn out is:

5/6

X Answer: 1.36111

Recall that the variance of an exponential with parameter λ is $1/\lambda^2$.

Solution:

As we discussed, the time until all three lighbulbs burn out is the sum of an exponential random variable with parameter 3λ , an exponential random variable with parameter 2λ , and an exponential random variable with parameter λ . Furthermore, because of the freshstart property, we argued that these three random variables are independent. Therefore, since $\lambda=1$, the variance is

$$\frac{1}{3^2} + \frac{1}{2^2} + \frac{1}{1^2} = \frac{49}{36}.$$

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You have used 3 of 3 attempts

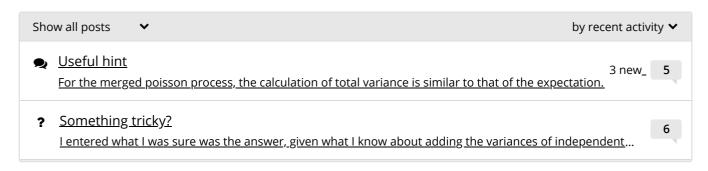
1 Answers are displayed within the problem



Discussion

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Topic: Unit 9: Bernoulli and Poisson processes:Lec. 23: More on the Poisson process / 10. Exercise: Lightbulb burnouts



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