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3. Exercise: Poisson process definition

Exercises due May 13, 2020 05:29 IST Completed

Exercise: Poisson process definition

1/1 point (graded)

Consider a Poisson process with rate $\lambda = 4$, and let $N(t)$ be the number of arrivals during the time interval $[0, t]$.

Suppose that you have recorded this process in a movie and that you play this movie at twice the speed. The process that you will be seeing in the sped-up movie satisfies the following (pick one of the answers):

☐ is a Poisson process with rate 2

☐ is a Poisson process with rate 4

☒ is a Poisson process with rate 8

☐ is not a Poisson process



Solution:

Let $M(t)$ be the number of arrivals in the sped-up movie between times 0 and t . By time t , you have watched in the sped-up movie whatever happens in the original process from time 0 through time $2t$. Thus, $M(t) = N(2t)$. The independence and time-homogeneity properties of the original process can be seen to imply the same properties for the sped-up process. Furthermore,



$$\mathbf{P}(M(\delta) = 1) = \mathbf{P}(N(2\delta) = 1) \approx \lambda \cdot (2\delta) = (2\lambda)\delta,$$

which leads to the rather intuitive conclusion that the sped up process has a rate of $2\lambda = 8$.

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You have used 1 of 1 attempt

i Answers are displayed within the problem

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What if lambda = n*p?

What would be if we considered this process as an approximation of Bernoulli process as was in the last ...

1



Which clock should I consider?

Suppose there is clock in the movie and there is clock in my room where I am watching this movie. Whic...

4



Hint

Don't get confused by that fourth option.

2

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