3. Exercise: Poisson process definition

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,

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

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

提交 你已经尝试了1次（总共可以尝试1次）

Answers are displayed within the problem

讨论

显示讨论

主题： Unit 9 / Lec. 22 / 3. Exercise: Poisson process definition