3. Exercise: The sum of Poisson r.v.'s

Exercises due May 13, 2020 05:29 IST *Completed*

Exercise: The sum of Poisson r.v.'s

1/1 point (graded)

Consider a Poisson process with rate $\lambda = 1$. Consider three times that satisfy $0 < t_1 < t_2 < t_3$. Let M be the number of arrivals during the interval $[0, t_2]$. Let N be the number of arrivals during the interval $[t_1, t_3]$. Is the random variable $M + N$ guaranteed to be Poisson?

No ✔ **Answer:** No

Solution:

Because the two time intervals overlap, M and N are not independent and the result in the preceding video does not apply. Consider the extreme case where $t_1 \approx 0$ and $t_2 \approx t_3$. In that case, the two intervals almost coincide, and therefore $M = N$ with high probability. In that case, the PMF of $M + N$ is concentrated on the even integers, which cannot happen for a Poisson PMF.

Submit You have used 1 of 1 attempt

Answers are displayed within the problem

Discussion

Hide Discussion

Topic: Unit 9: Bernoulli and Poisson processes:Lec. 23: More on the Poisson process / 3. Exercise: The sum of Poisson r.v.'s

Show all posts by recent

? Even integers

"M+N is concentrated on the even integers" - why? (I guess I am just failing to realise something fundam...

2

Superposition

Based on the video i may have chosen the obvious when considering disjoint distributions but i chose to...

3

Useful discussion

What were the assumptions we studied in the last lecture?

3