

Problems from Assignment 21

1. Suppose that N is a Poisson process with rate λ . Let X be the time until the second event occurs.

(a) Using the same approach that we did with the waiting time for the first event, show that:

$$f_X(x) = \begin{cases} \lambda^2 x e^{-\lambda x} & x \geq 0 \\ 0 & \text{otherwise.} \end{cases}$$

(b) Notice this the same pdf we got from the sum of two independent exponential distributions. Explain why that makes sense.

(c) Suppose $\lambda = \frac{1}{4}$. Find $P(3 \leq X \leq 9)$, using:

i. $f_X(x)$ above

ii. the distributions of N (remember N consists of infinitely many random variables) .