

Probability Function

A Poisson process is a situation in which a phenomenon occurs at a constant average rate. Each occurrence is independent of all other occurrences; in a Poisson process, an event does not become more likely to occur just because it's been a long time since its last occurrence. The location of potholes on a highway or the emission over time of particles from a radioactive substance may be Poisson processes.

The probability density function:

$$f(x) = \begin{cases} \lambda e^{-\lambda x}, & x \geq 0, \\ 0, & x < 0 \end{cases}$$

describes the relative likelihood of an occurrence at time or position x , where λ describes the average rate of occurrence.

The probability $P(a < x < b)$ of an event occurring in the interval between a and b is given by:

$$\int_a^b f(x) dx.$$

Compute this integral:

- a) for the case in which a and b are both positive (assume $a < b$),
- b) for the case in which $a \leq 0$ and $b > 0$,
- c) for the case in which $a \leq 0$ and $b \leq 0$.

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