Suppose the number of rain drops falling on your head is a Poisson random variable, with a rate of 4 drops per second. What is the probability that you get exactly 20 hits in next 10 seconds? Recall that the PMF of a Poisson random variable of rate λ is $p(x) = e^{-\lambda}\lambda^x/x!$, $x = 0, 1, 2, \ldots$

Solution: The rate is 40 drops in 10 seconds, so the number of rain drops in next 10 seconds is a Poisson(40) random variable X. We are interested in the probability of the event $X = 20$, which equals $e^{-40} \cdot \frac{40^{20}}{20!} \approx 1.92 \cdot 10^{-4}$.