

## Answer on Question #70067 – Math – Statistics and Probability

### Question

A website has on the average two hits per hour. Assuming a Poisson distribution for the number of hits per hour ( $X$ ), calculate the probability that there are at most three hits.

### Solution

Assume that  $X$  has a Poisson distribution with rate  $\lambda$ , then we have:

$$P(X = k) = \frac{\lambda^k}{k!} e^{-\lambda}, k = 0, 1, \dots$$

Since average value of  $X$  (i.e. the mathematical expectation of  $X$ ) is equal to  $\lambda$  then we have  $\lambda=2$ , and

$$P(X = k) = \frac{2^k}{k!} e^{-2}, k = 0, 1, \dots$$

Then required probability is

$$\begin{aligned} P(X \leq 3) &= P(X = 0) + P(X = 1) + P(X = 2) + P(X = 3) = e^{-2} + 2e^{-2} + 2e^{-2} + \frac{4}{3}e^{-2} = \\ &= \frac{19}{3e^2} \approx 0.857. \end{aligned}$$

**Answer:**  $\frac{19}{3e^2}$ .