Answer on Question #66443 – 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

Assuming a Poisson distribution for the number of hits per hour (X), we have

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

for $k = 0,1,2,\ldots$, where λ is the expected value of X.

In our case $\lambda = 2$, thus

$$P(X = k) = \frac{2^k e^{-2}}{k!}.$$

So it remains to calculate probability that there are at most three hits:

$$P(X \leq 3) = P(X = 0) + P(X = 1) + P(X = 2) + P(X = 3)$$

$$= \sum_{k=0}^{3} \frac{2^k e^{-2}}{k!} = \frac{19}{3e} \approx 0.857$$

Answer: $P(X \leq 3) = \frac{19}{3e} \approx 0.857.$