Answer on Question #80737 – Math – Statistics and Probability

Question

An online retailer has two adverts posted in different parts of a well-known social networking website, Advertisement A and Advertisement B. An average of 2 'clicks' are generated by Advertisement A during the period Monday 10.00 to 10.05am. There are on average 5 'clicks' generated by Advertisement B during the same period. Calculate the probability that on a particular Monday between 10.00 and 10.05am Advertisement A generates at most 3 clicks.

Solution

Let $X =$ the number of clicks on Advertisement A during the period Monday 10.00 to 10.05am. X is a random variable and has Poisson distribution with pdf:

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

where λ is the average.

Then

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

$= e^{-2}\frac{2^0}{0!} + e^{-2}\frac{2^1}{1!} + e^{-2}\frac{2^2}{2!} + e^{-2}\frac{2^3}{3!} = e^{-2}\left(1 + 2 + 2 + \frac{4}{3}\right) = \frac{19}{3}e^{-2} \approx$

$\approx 0.8571.$

Answer: 0.8571.