Answer on Question #85425 – Math – Statistics and Probability

Question

Telephone calls arrived at a switch board at random intervals at an average rate of 24calls per hour. Find the probability of receiving no calls in 5minutes? more than 4calls in 5minutes.

Solution

It is a Poisson distribution problem.

Since the rate is listed per hour, we need to figure out the rate per 5 minutes.

The rate per 5 minutes is

$$\mu = \frac{24*5}{60} = 2.$$

Then

$$P(X = 0) = \frac{\mu^0 e^{-\mu}}{0!} = e^{-2} \approx 0.1353.$$

$$P(X > 4) = 1 - P(X \leq 4) = 1 - \frac{\mu^0 e^{-\mu}}{0!} - \frac{\mu^1 e^{-\mu}}{1!} - \frac{\mu^2 e^{-\mu}}{2!} - \frac{\mu^3 e^{-\mu}}{3!} - \frac{\mu^4 e^{-\mu}}{4!} =$$

$$= 1 - \left(\frac{\mu^0}{0!} - \frac{\mu^1}{1!} - \frac{\mu^2}{2!} - \frac{\mu^3}{3!} - \frac{\mu^4}{4!}\right) e^{-\mu} \approx 0.0527.$$

Answer: $0.1353; 0.0527.$