Answer on Question #44828 – Math - Statistics and Probability

At a cafeteria the customers arrive at an average of $\lambda = 0.3$ per minute. The probability that a) exactly 2 customers arrive in a 10 minute span b)2 or more customers arrive in a 10 minute span c) one customer arrives in a 5 minute span and one customer arrives in the next minute span is

Solution

We use a Poisson process with a parameter λt, $\lambda t = 0.3 \times 10 = 3$ in items a) and b) .

   a)

$$P(2 \ customers \ in \ 10 \ minute \ span \ ) = \frac{e^{-0.3 \cdot 10}(0.3 \cdot 10)^2}{2!} = 0.224.$$

   b)

$$P(2 \ or \ more \ in \ 10 \ minute \ span \ ) = 1 - P(0) - P(1)$$
$$= 1 - \frac{e^{-0.3 \cdot 10}(0.3 \cdot 10)^0}{0!} - \frac{e^{-0.3 \cdot 10}(0.3 \cdot 10)^1}{1!} = 0.8.$$

   c)

$$P(one \ customer \ in \ 5 \ minute \ and \ one \ customer \ in \ the \ next \ minute)$$
$$= \frac{e^{-0.3 \cdot 5}(0.3 \cdot 5)^1}{1!} \cdot \frac{e^{-0.3 \cdot 1}(0.3 \cdot 1)^1}{1!} = 0.074.$$