## Answer on Question \#72712 - Math - Statistics and Probability.

## Question

The number of customers arriving per hour at a certain automobile service facility is assumed to follow a Poisson distribution with mean $\lambda=7$.
(a) Compute the probability that more than 10 customers will arrive in a 2hour period.
(b) What is the mean number of arrivals during a 2-hour period?

## Solution

The random number $X$ of customers arriving per hour is Poisson distributed with mean $\lambda=7$.

This is The Poisson distribution. We will use the formula

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

(a) We want

$$
\operatorname{Pr}(X>10)=1-\operatorname{Pr}(X \leq 10)=1-\sum_{x=0}^{10} \frac{(2 \lambda)^{x}}{x!} e^{-2 \lambda} .
$$

So,

$$
\begin{gathered}
\operatorname{Pr}(X>10)=1-\sum_{x=0}^{10} \frac{(2 \lambda)^{x}}{x!} e^{-2 \lambda}=1-\sum_{x=0}^{10} \frac{(14)^{x}}{x!} e^{-14} \approx \\
\approx 1-(0.00000+0.00001+0.00008+0.00038+0.00133+0.00373+0.00870+ \\
+0.01739+0.03044+0.04734+0.06628)=1-0.17577=0.82423 .
\end{gathered}
$$

(b) The mean number of arrivals during a 2-hour period is $2 \lambda=2 \cdot 7=14$.

Answer: (a) 0.82423; (b) 14.

