

## Answer on Question #53412 – Math – Statistics and Probability

### Question

The amount of time that an electrician requires to switch on the generator in a theater when the power goes off is a random variable having an exponential distribution with a mean of 4 minutes. What is the Probability that the electrician requires less than 2 minutes on atleast 4 of the next 6 days to switch on the generator.

### Solution

If the mean of a random variable having an exponential distribution is  $\mu = 4$ , then  $\lambda = \frac{1}{\mu} = \frac{1}{4}$ .

If  $X$  is a random variable having an exponential distribution, then

$$p = P(X < 2) = F(2) = 1 - e^{-\frac{1}{4} \cdot 2} = 1 - e^{-1/2} = 0.393469$$

is probability that the electrician requires less than 2 minutes in one day,  $q = 1 - p$ ,  $F$  is the cumulative distribution function of a random variable having an exponential distribution.

Using binomial distribution, probability that the electrician requires less than 2 minutes on at least 4 of the next 6 days to switch on the generator is

$$P(Z \geq 4) = P(Z = 4) + P(Z = 5) + P(Z = 6) = \binom{6}{4} p^4 q^2 + \binom{6}{5} p^5 q + \binom{6}{6} p^6 = 0,170295,$$

where  $\binom{n}{k} = \frac{n!}{k!(n-k)!}$ .

**Answer:** 0,170295.