Answer on Question #46242 – Math – Statistics and Probability

The arrival of trucks on a receiving dock is a Poisson process with a mean arrival rate of two per hour.

(a) Find the probability that exactly 5 trucks arrive in a three-hour period. **(b)** Find the probability that less than two will arrive in 4 hours.

Solution

Probability that the number of arrivals in time interval t is k

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

where λ is the expected number of events in a unit of time.

(a) The probability that exactly 5 trucks arrive in a three-hour period

$$P(X = 5; 3) = e^{-(2\cdot 3)} \frac{(2 \cdot 3)^5}{5!} = e^{-6} \frac{6^5}{5!} = 0.16.$$

(b) The probability that less than two trucks will arrive in 4 hours is

$$P(X < 2; 4) = P(X = 0; 4) + P(X = 1; 4) = e^{-(2\cdot 4)} \frac{(2 \cdot 4)^0}{0!} + e^{-(2\cdot 4)} \frac{(2 \cdot 4)^1}{1!} = e^{-8}(1 + 8)$$
$$= 0.003.$$

Answer: (a) 0.16; (b) 0.003.