

Answer on Question #58982 – Math – Statistics and Probability

Question

Potholes requiring repairing occur at an average rate of 3.2 potholes per kilometer.

- a) What is the probability that no potholes require repair in 5km road and
- b) what is the probability that at most 3 potholes require a 200meter repair?

Solution

To find the probability of a specific number of successes in the given number of trials, one should use Poisson distribution.

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

- a) $\lambda = 3.2 \times 5 = 16$;
 $k = 0$;

$$P(0) = \frac{16^0 e^{-16}}{0!} = 1.13 \times 10^{-7}$$

- b) $\lambda = 3.2 \times 0.2 = 0.64$;

$$P(k \leq 3) = \sum_{k_i} P_{k_i}$$

$$k = 0, 1, 2, 3$$

$$P(0) = \frac{0.64^0 e^{-0.64}}{0!} = 0.527;$$

$$P(1) = \frac{0.64^1 e^{-0.64}}{1!} = 0.337;$$

$$P(2) = \frac{0.64^2 e^{-0.64}}{2!} = 0.108;$$

$$P(3) = \frac{0.64^3 e^{-0.64}}{3!} = 0.023;$$

$$P(k \leq 3) = 0.527 + 0.337 + 0.108 + 0.023 = 0.995.$$

Answer: a) 1.13×10^{-7} ; **b)** 0.995.