Question #72705, Math / Statistics and Probability

The average number of field mice per acre in a 5-acre wheat field is estimated to be 12. Find the probability that fewer than 7 field mice are found
(a) on a given acre;
(b) on 2 of the next 3 acres inspected

Answer.

(a) Poisson distribution with a mean $\mu = 12$.

$$P(X < 7) = e^{-12}\left(\frac{12^0}{0!} + \frac{12^1}{1!} + \frac{12^2}{2!} + \frac{12^3}{3!} + \frac{12^4}{4!} + \frac{12^5}{5!} + \frac{12^6}{6!}\right) = 0.0458.$$

(b) Binomial distribution with $p = 0.0458$, $n = 3$.

$$P(X = 2) = C_3^2 0.0458^2(1 - 0.0458) = 0.0060.$$