

Answer on Question #72153, Math / Statistics and Probability

Question 6: Find the probability that seven of 10 persons will recover from a tropical disease if we can assume independence and the probability is 0.80 that any one of them will recover from the disease.

Solution

A random variable  $X$  has a binomial distribution and it is referred to as a binomial random variable. The probability that the event will happen exactly  $x$  times in  $n$  trials is given by the probability function

$$b(x; n, p) = \binom{n}{x} p^x (1 - p)^{n-x}$$

Substituting  $x = 7$ ,  $n = 10$  and  $p = 0.80$  into the formula for the binomial distribution, we have

$$\begin{aligned} b(7; 10, 0.80) &= \binom{10}{7} (0.80)^7 (1 - 0.80)^{10-7} = \frac{10!}{7! (10 - 7)!} (0.80)^7 (0.20)^3 = \\ &= \frac{10(9)(8)}{1(2)(3)} (0.80)^7 (0.20)^3 \approx 0.2013266 \end{aligned}$$