Answer on Question #61152 – Math – Statistics and Probability

Question

A binomial probability experiment is conducted with the given parameters. Compute the probability of x successes in the n independent trials of the experiment.
n =9, p =0.8, x ≤3.
The probability of x ≤3 successes is ?. (Round to four decimal places as needed.)

Solution

Given the binomial distribution with parameters n = 9, p = 0.8, q = 1-p = 0.2,

$$P_n(k) = C_n^k\, p^k\, q^{n-k},$$

where $C_n^k = \frac{n!}{k!(n-k)!}$, $n! = 1 \cdot 2 \cdot 3 \cdot \ldots \cdot (n-1) \cdot n$.

Then the probability of x ≤3 successes is

$P(x \le 3) = P_9(0) + P_9(1) + P_9(2) + P_9(3) = C_9^0 p^0 q^9 + C_9^1 p^1 q^8 + C_9^2 p^2 q^7 + C_9^3 p^3 q^6 = 0.0037.$

Answer: 0.0037.