Answer on Question #46545 – Math – Statistics and Probability

Problem.

The random variable X has Binomial distribution with mean 4 and variance 2.4.
Find the parameters 'n' and 'p' and hence calculate the probability P[4 £ X £ 6].

Solution:

If the random variable X has Binomial distribution with parameters n and p. Then mean $\mathrm{E}(X) = np$ and variance $\mathrm{Var}(X) = np(1-p)$. Hence $4 = np$ and $2.4 = np(1-p)$. Therefore $1 - p = \frac{2.4}{4} = 0.6$ or $p = 0.4$ and from $4 = np$ we deduce $n = 10$. Then

$$P(4 \le X \le 6) = P(4) + P(5) + P(6) = \binom{10}{4} 0.4^4 0.6^6 + \binom{10}{5} 0.4^5 0.6^5 + \binom{10}{5} 0.4^6 0.6^4$$
$$\approx 0.563$$

Answer: $p = 0.4, n = 10, P(4 \le X \le 6) \approx 0.563.$