

Assignment 4

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CBSE Class 12 Exercise 13.5 Question 6

A bag consists of 10 balls each marked with one of the digits 0 to 9 .If four balls are drawn successively with replacement from the bag , what is the probability that none is marked with digit 0?

Solution

Let us assume that number of balls with digit marked as zero among the experiment of 4 balls drawn simultaneously be x .

As we can see balls that the balls are drawn with replacement, thus, the trail is a bernaulli trial .

Probability of a ball drawn from the bag to be marked as digit zero = $1/10$.

So , we can see that X has a binomial distribution with $n=4$ and $p = 1/10$

Thus $q = 1 - p = 1 - 1/10 = 9/10$.

Thus, $P(X = x) = \binom{n}{x} q^{n-x} p^x$ where $x = 0,1,2,\dots,n$.

$$= \binom{4}{x} \left(\frac{9}{10}\right)^{4-x} \left(\frac{1}{10}\right)^x$$

Probability of no ball marked with zero among the four balls $= P(X=0)$

$$= \binom{4}{0} \left(\frac{9}{10}\right)^{4-0} \left(\frac{1}{10}\right)^0$$

$$= \left(\frac{9}{10}\right)^4$$