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 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,....n.
= $\binom{4}{x} \frac{9}{10}^{4-x}\ \frac{1}{10}^{x}$
Probability of no ball marked with zero among the four balls =P(X=0)
= $\binom{4}{0}\ \frac{9}{10}^{4-0}\ \frac{1}{10}^{0}$
= $(\frac{9}{10})^{4}$

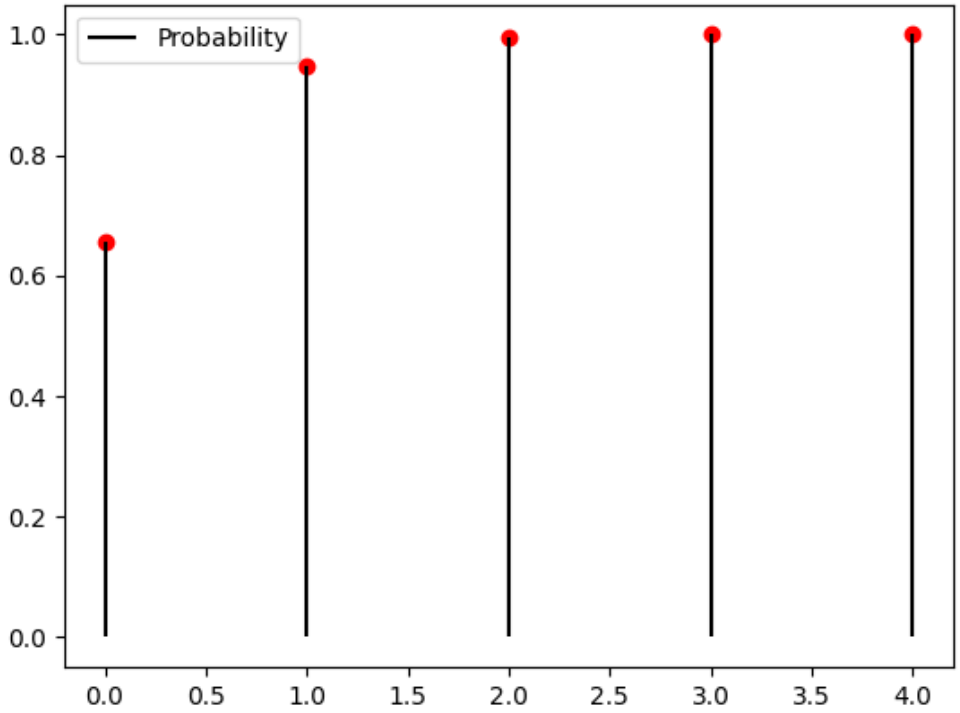

Figure: Cumulative Distribution Function

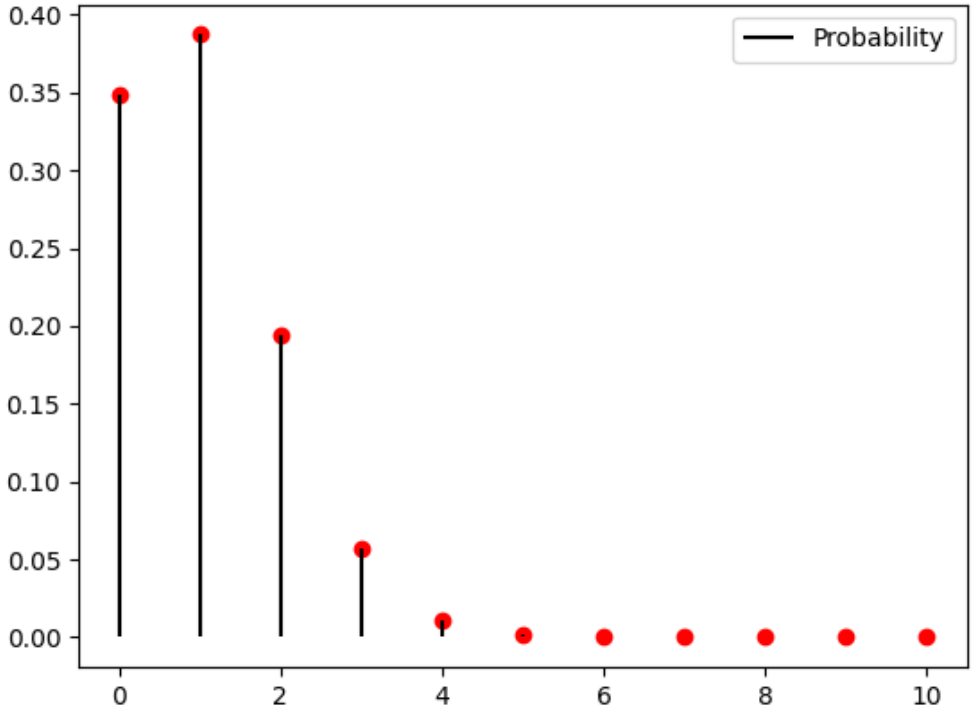

Figure: Probability Mass Function