AI1103-Assignment 1

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Python codes :

https://github.com/Aayush−2492/Assignments/blob
/main/Assignment%201/codes/Assignment1.py

Latex codes :

https://github.com/Aayush−2492/Assignments

QUESTION 1.6

In a box containing 100 bulbs, 10 are defective. The probability that out of a sample of 5 bulbs, none is defective is?

SOLUTION

Probability of getting a defective bulb
$= p = \dfrac{10}{100} = \dfrac{1}{10}$

Let q be the probability of not finding a defective bulb. By Complement Law,

$$q = 1 - p = \dfrac{9}{10}$$

Let X be the random variable function for number of defective bulbs out of a sample of 5 bulbs and k be the number of defective bulbs out of a sample of five bulbs

By Binomial Distribution,

$$P(X = k) = \binom{5}{k} p^k q^{5-k}$$

where $P(X = k)$ is the probability of finding k defective bulbs out of a sample of 5 bulbs.

$P(X = 0) = \binom{5}{0} p^0 q^5 =$ Probability of finding zero defective bulbs

Substituting values of p and q, we get,

$$P(X = 0) = \left(\tfrac{9}{10}\right)^5$$

Therefore, Required probability

$$= \left(\dfrac{9}{10}\right)^5$$