AI1103: Assignment 1

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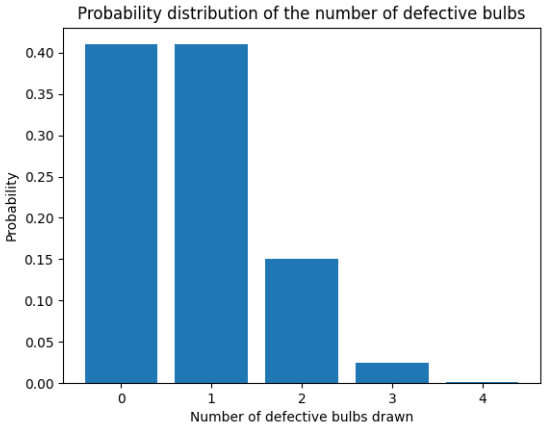
Download all python codes from

https://github.com/ASHWITHA−11008/Assignment−1/blob/main/assignment−1.py

and latex-tikz codes from

https://github.com/ASHWITHA−11008/Assignment−1/blob/main/Assignment−1.tex



1 Problem-1.13

From a lot of 30 bulbs which include 6 defectives, a sample of 4 bulbs is drawn at random with replacement. Find the probability distribution of the number of defective bulbs.

2 Solution:

Given 30 bulbs which include 6 defectives and 4 bulbs are drawn at random with replacement.

Let us assume a random variable X:
X=Number of defective bulbs drawn.
p=probability of drawing a defective bulb.
q=1-p

Binomial distribution:
$\Pr(X = k) = {}^{n}C_k \times (p^k) \times (q^{n-k})$

$$\Pr(X = 0) = {}^{4}C_0 \times \left(\frac{24}{30}\right)^4 = 0.409$$

$$\Pr(X = 1) = {}^{4}C_1 \times \left(\frac{6}{30}\right) \times \left(\frac{24}{30}\right)^3 = 0.409$$

$$\Pr(X = 2) = {}^{4}C_2 \times \left(\frac{6}{30}\right)^2 \times \left(\frac{24}{30}\right)^2 = 0.154$$

$$\Pr(X = 3) = {}^{4}C_3 \times \left(\frac{6}{30}\right)^3 \times \left(\frac{24}{30}\right) = 0.02$$

$$\Pr(X = 4) = {}^{4}C_4 \times \left(\frac{6}{30}\right)^4 = 0.016$$