

AI1103: Assignment 1

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Download all python codes from

[https://github.com/ASHWITHA-11008/
Assignment-1/blob/main/assignment-1.py](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](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.

Binomial distribution:

$$\Pr(X = k) = {}^nC_k \times \left(\frac{6}{30}\right)^k \times \left(\frac{24}{30}\right)^{n-k}$$

$$\Pr(X = 0) = {}^4C_0 \times \left(\frac{24}{30}\right)^4 = 0.4096$$

$$\Pr(X = 1) = {}^4C_1 \times \left(\frac{6}{30}\right) \times \left(\frac{24}{30}\right)^3 = 0.4096$$

$$\Pr(X = 2) = {}^4C_2 \times \left(\frac{6}{30}\right)^2 \times \left(\frac{24}{30}\right)^2 = 0.1536$$

$$\Pr(X = 3) = {}^4C_3 \times \left(\frac{6}{30}\right)^3 \times \left(\frac{24}{30}\right) = 0.0256$$

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

