

AI1103-Assignment 7

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Download all python codes from

<https://github.com/ayushjha2612/AI11003/tree/main/Assignment7/Codes>

and latex-tikz codes from

<https://github.com/ayushjha2612/AI11003/tree/main/Assignment7>

GATE 2014(ME - SET3), Q.10 (APTI. SECTION)

A batch of one hundred bulbs is inspected by testing four randomly chosen bulbs. The batch is rejected if even one of the bulbs is defective. A batch typically has five defective bulbs. The probability that the current batch is accepted is —.

ANSWER

0.814

SOLUTION

Let $X = 0$ if the batch is not accepted and $X = 1$ if it is accepted.

And let $Y = 0$ if the bulb is defective and $Y = 1$ if it is a non-defective.

$$\text{Total no. of bulbs} = 100 \quad (0.0.1)$$

$$\text{No. of non-defective bulbs} = 100 - 5 \quad (0.0.2)$$

$$= 95 \quad (0.0.3)$$

$$\Pr(Y = 1) = \frac{95}{100} \quad (0.0.4)$$

$$= \frac{19}{20} \quad (0.0.5)$$

$$= p \quad (0.0.6)$$

And let

$$\Pr(Y = 0) = \frac{1}{20} \quad (0.0.7)$$

$$= q = 1 - p \quad (0.0.8)$$

We have to choose 4 non defective bulbs,

$$\Pr(X = 1) = \binom{4}{4} p^4 q^{4-4} \quad (0.0.9)$$

$$= \left(\frac{19}{20}\right)^4 \quad (0.0.10)$$

$$= 0.814 \quad (0.0.11)$$

Therefore, the probability that the current batch is accepted is 0.814.

The theory Vs simulation plot can be viewed at figure 0.

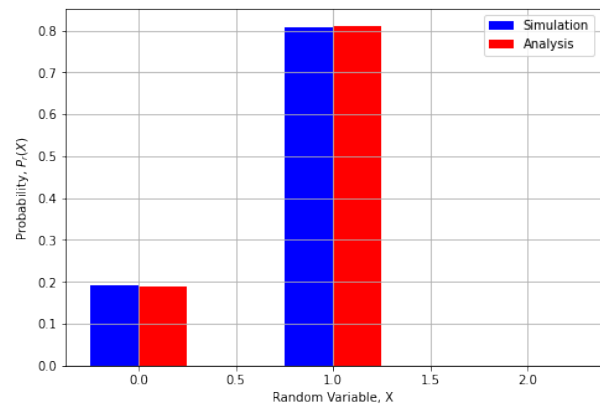


Fig. 0: Theory Vs Simulation