

AI1103-Assignment 1

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Download all python codes from

https://github.com/DineshAvulaMohanaDurga/AI1103/blob/main/assignment_1/codes/ai1103_assignment1.py

and latex codes from

https://github.com/DineshAvulaMohanaDurga/AI1103/blob/main/assignment_1/main.tex

1 QUESTION

(Problem 1.10) There are 5% defective items in a large bulk of items. What is the probability that a sample of 10 items will not contain more than one defective items.

2 ANSWER

let p be the probability for an item to be defective
Given percentage of defective items in a bunch of items = 5%

$$p = 0.05 = 5\% \quad (2.0.1)$$

Lets assume that we are given 10 items and the event that given condition is satisfied be E .
From binomial distribution

$$\Pr(X = k) = {}^{10}C_k \times (0.95)^{10-k} \times (0.05)^k \quad (2.0.2)$$

probability that all of them are non defective

$$\Pr(X = 0) = (0.95)^{10} \quad (2.0.3)$$

probability that one of them is defective

$$\Pr(X = 1) = {}^{10}C_1 \times (0.95)^9 \times (0.05) \quad (2.0.4)$$

So the probability that 10 items does not have more than 1 defective item

$$\begin{aligned} \Pr(E) &= (0.95)^{10} + {}^{10}C_1 \times (0.95)^9 \times (0.05) \\ &= 0.9139 \\ &= 91.39\% \end{aligned} \quad (2.0.5)$$

\therefore the the probability that 10 items does not have more than 1 defective item is 91.39%