AI1103 : Assignment 3

Shashank Anirudh - CS20BTECH11040

Download all python codes from

https://github.com/shashank−anirudh−rachapalle/Probability−and−random−variables/blob/main/Assignment3/codes/Assignment3.py

and latex-tikz codes from

https://github.com/shashank−anirudh−rachapalle/Probability−and−random−variables/blob/main/Assignment3/Assignment3.tex

Problem GATE 2019 (ME), Q. 40:

The probability that a part manufactured by a company will be defective is 0.05.If 15 such parts are selected randomly and inspected,the probability that atleast two parts will be defective is .....

Solution:

Let X$\in$ $\{0, 1, 2, 3....15\}$ be the random variable,where X represents the number of defective parts.The distribution is binomial.

$$p = 0.05 \tag{1}$$

$$q = 1 - p = 0.95 \tag{2}$$

Probability that atleast two parts will be defective is $\Pr(X > 1)$.

$$\begin{aligned}\Pr(X > 1) &= 1 - \Pr(X = 0) - \Pr(X = 1)\\ &= 1 - {}^{15}C_0 p^0 q^{15} - {}^{15}C_1 p^1 q^{14}\end{aligned}$$

From (1) and (2)

$$\begin{aligned}\Pr(X > 1) = 1 &- {}^{15}C_0 \times (0.05)^0 \times (0.95)^{15}\\ &- {}^{15}C_1 \times (0.05)^1 \times (0.95)^{14} = 0.1709\end{aligned}$$

$$\therefore \Pr(X > 1) = 0.1709$$