NCERT Assignment

EE22BTECH11009-ANUPAMA KULSHRESHTHA

There are 5% defective items in a large bulk of items. What is the probability that a sample of 10 items will include not more than one defective item?

Solution:

Parameter	Values	Description
n	10	Number of items
k	0,1	Number of defective items
p	0.05	Probability of being defective
X	1 if defective 0 if not defective	Bernoulli Random Variable
Y	$\sum_{i=1}^{n} X_i$	Binomial Random Variable

TABLE 1: Definition of X and parameters.

The pmf of Y is given by

$$Y \sim \text{Bin}\,(n, p) \tag{1}$$

$$F_Y(n) = \Pr(Y \le n) \tag{2}$$

$$= \sum_{k=0}^{n} {}^{10}C_k p^k (1-p)^{10-k} \tag{3}$$

We require $\Pr(Y \le 1)$. Since $n = 1$,

$$F_Y(1) = \Pr(Y \le 1) \tag{4}$$

$$= \sum_{k=0}^{1} {}^{10}C_k (0.05)^k (0.95)^{10-k} \tag{5}$$

$$= 0.9138 \tag{6}$$