Assignment

Barath surya M — EE22BTECH11014

Question 9.3.3 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:

$$p = \frac{5}{100} \tag{1}$$

$$= 0.05 \tag{2}$$

$$n = 10 \tag{3}$$

Let X be a Binomial random variable with parameters p and n

$$\Pr(X = k) = {}^{n}C_k p^k (1-p)^{n-k} \tag{4}$$

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

CDF of X

$$F_X(n) = \Pr(X \le n) \tag{6}$$

$$= \sum_{k=0}^{n} {}^{10}C_k (0.05)^k (0.95)^{10-k} \tag{7}$$

Since, according to question n here equals,

$$\implies F_X(1) = \Pr(X = 0) + \Pr(X = 1) \tag{8}$$

$$= \sum_{k=0}^{1} {}^{10}C_k (0.05)^k (0.95)^{10-k} \tag{9}$$

$$= 0.9138 \tag{10}$$