Assignment 6

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Outline

Question

Papoulis Chapter 3 Example 3.13

An order of 10^4 parts is received. The probability that a part is defective equals 0.1. What is the probability that the total number of defective parts does not exceed 1100?

Solution

Given,

$$\Pr\left(defective\right) = p = 0.1 \tag{1}$$
$$\Pr\left(non-defective\right) = q = 1 - p \tag{2}$$
$$= 0.9 \tag{3}$$
$$\tag{4}$$

1. Let the number of defective parts be k.Then,

$$\Pr\left(k_1 \leq k \leq k_2\right) = \sum_{k=k_1}^{k_2} \binom{n}{k} \left(p^k\right) \left(q^{n-k}\right) \tag{5}$$

$$\tag{6}$$

Here,

$$n = 10^4 \tag{7}$$

$$k1 = 0 \tag{8}$$

$$k2 = 1100 \tag{9}$$

$$\implies \Pr\left(0 \leq k \leq 1100\right) = \sum_{k=0}^{1100} \binom{10^4}{k} (0.1)^k (0.9)^{n-k} \tag{10}$$