AI1110
Assignment 11

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Outline

CBSE Probability Grade 12 Exercise 13.5.13

It is known that 10% of certain articles manufactured are defective. What is the probability that in a random sample of 12 such articles, 9 are defective?

Solution

Let a Bernoulli random variable $X \in \{0, 1\}$ denote whether the chosen sample is defective or not.

X	**Outcome**	**Probability**
0	Not defective	$q = 0.9$
1	Defective	$p = 0.1$

Table 1: Bernoulli distribution

Consider an experiment consisting of 12 Bernoulli trials and denote the number of defective samples obtained by a binomial random variable $Y \in \{0, 1, \ldots, 12\}$. This can be expressed as a binomial distribution with probability mass function given by:

$$p_Y(k) = \binom{n}{k}(1-p)^{n-k}p^k, \ 0 \leq k \leq n \tag{1}$$

where $n = 12$ and $p = 0.1$

Answer

The desired probability is given by:

$$p_Y(9) = \binom{12}{9}(1-0.1)^3(0.1)^9 \tag{2}$$

$$\approx 1.6 \times 10^{-7} \tag{3}$$

Plot of the probability mass function