

Learning From Data

Exercise 1.8

Proof

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January 13, 2018

Task

Exercise 1.8

If $\mu = 0.9$, what is the probability that a sample of 10 marbles will have $\nu \leq 0.1$? [Hints: 1. Use binomial distribution. 2. The answer is a very small number.]

Solution

The equation for cumulative binomial distribution is:

$$\Pr(X \leq k) = \sum_{i=0}^{\lfloor k \rfloor} \binom{n}{i} p^i (1-p)^{n-i}$$

In our case we should count the probability to get 0 or 1 marbles and sum them up.

$$\begin{aligned} Pr(\nu \leq 0.1) &= \binom{10}{0} 0.9^0 * 0.1^{10} + \binom{10}{1} 0.9^1 * 0.1^9 \\ &= 9.1000000000000004e-09 \end{aligned}$$