

# AI 1103 Assignment-1

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Download all python codes from here

[https://github.com/Shantanu467/AI1103/blob/main/Assignemt\\_1/codes/Assignmet1.py](https://github.com/Shantanu467/AI1103/blob/main/Assignemt_1/codes/Assignmet1.py)

and latex-tikz codes from

[https://github.com/Shantanu467/AI1103/blob/main/Assignemt\\_1/codes/Assignmet-1.tex](https://github.com/Shantanu467/AI1103/blob/main/Assignemt_1/codes/Assignmet-1.tex)

## QUESTION-4.7

A bag consists of 10 balls each marked with one of the digits 0 to 9. If four balls are drawn successively with replacement from the bag, what is the probability that none is marked with the digit 0?

## SOLUTION

Let  $X$  be number marked on ball drawn. Since the balls are drawn with replacement, the trials are Bernoulli trials.

So  $X$  has Binomial Distribution

$$Pr(X = k) = {}^nC_k \times q^{n-k} \times p^k \quad (1)$$

Here,

$n$  = number of times we pick the ball

$p$  = Probability of getting ball marked as 0

$q = 1 - p$

Variables	$n$	$p$	$q$	$k$
Values	4	1/10	9/10	0

Now,

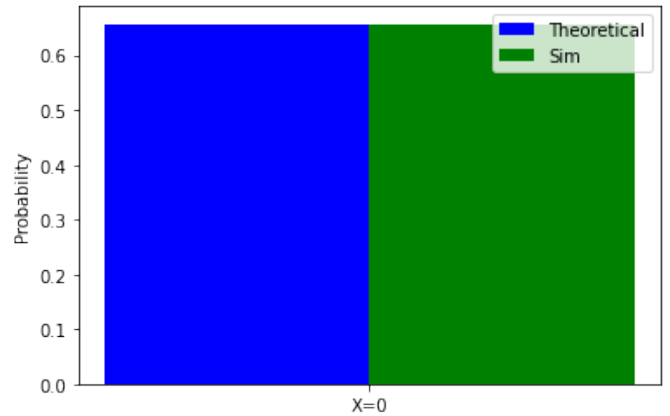
$$Pr(X = 0) = {}^4C_0 \times \left(\frac{9}{10}\right)^{(4-0)} \times \left(\frac{1}{10}\right)^0 \quad (2)$$

$$= \frac{4!}{(4-0)!0!} \times 1 \times \left(\frac{9}{10}\right)^4 \quad (3)$$

$$= \left(\frac{9}{10}\right)^4 \quad (4)$$

$$= 0.6561 \quad (5)$$

Therefore, The probability that none of ball is marked with 0 is **0.6561**



The above graph shows the close relation between Theoretical and simulated results.