AI 1103 Assignment-1

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Download all python codes from here

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https://github.com/
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and latex-tikz codes from

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https://gi
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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

$$P(X=x)=\binom{n}{x}q^{n-x}p^{x} \tag{1}$$

Here,

$$n = \text{number of times we pick the ball} = 4 \tag{2}$$

$$p = \text{Probability of getting0} = \frac{1}{10} \tag{3}$$

$$q = 1-p = 1-\frac{1}{10} = \frac{9}{10} \tag{4}$$

Hence,

$$P(X=x)=\binom{4}{x}\left(\frac{9}{10}\right)^{(4-x)}\left(\frac{1}{10}\right)^{(x)} \tag{5}$$

We need to find probability that no ball is marked 0,
i.e.

$$P(X=0) \tag{6}$$

Now,

$$P(X=0)=\binom{4}{0}\left(\frac{9}{10}\right)^{(4-0)}\left(\frac{1}{10}\right)^{(0)} \tag{7}$$

$$\implies P(X=0)=\frac{4!}{(4-0)!0!}\times 1\times\left(\frac{9}{10}\right)^{4} \tag{8}$$

$$\implies P(X=0)=\left(\frac{9}{10}\right)^{4}=0.6561 \tag{9}$$

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