Assignment 1

AI1110: Probability and Random Variables
Indian Institute of Techonology Hyderabad

Ashmeet Sidhu
BT22BTECH11004

12.13.6.13: Question. 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?

Answer: $\left(\frac{9}{10}\right)^4$.

Solution:

Variable	Definition
X	Number of balls marked with the digit 0 among the 4 balls drawn
p	Probability of drawing a ball marked 0 each time
n	number of trials

Here, we need that none of the balls are marked 0, i.e. $X = 0$

By binomial mass disribution function :

$$n = 4$$

$$p = \frac{1}{10}$$

$$P(X = 0) = {}^nC_0 \times (p)^0 \times (1 - p)^4$$

$$P(X = 0) = {}^4C_0 \times \left(\frac{1}{10}\right)^0 \times \left(\frac{9}{10}\right)^4$$

$$P(X = 0) = 1 \times 1 \times \left(\frac{9}{10}\right)^4$$

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