Assignment 2

Pradyumn Sharma

Download all Python codes from

https://github.com/96143/Assignment−2/blob/main/question%201.1.ipynb
https://github.com/96143/Assignment−2/blob/main/question%201.2.ipynb

Download latex codes from

https://github.com/96143/Assignment−2/blob/main/1.1

1 Problem 1.1

A jar contains 24 marbles, some are green and others are blue. If a marble is drawn at random from the jar, the probability that it is green is $\frac{2}{3}$. Find the number of blue marbles in the jar.

2 Solution 1.1

Let X be the random variable that denotes whether the drawn marble is blue or green
We know,
Bernoulli Distribution

$$P(x) = \begin{cases} p^x(1-p)^{1-x} & x = 0, 1; p+q = 1 \\ 0 \end{cases} \tag{2.0.1}$$

In Bernoulli Distribution
Mean -

$$\Sigma x = \mu_1^1 = p \tag{2.0.2}$$

We have probability of green marbles is $\frac{2}{3}$ i.e. Mean = $p = \frac{2}{3}$

$$\therefore \frac{\Sigma x}{N} = \frac{2}{3} \tag{2.0.3}$$

$$\frac{\Sigma x}{24} = \frac{2}{3} \tag{2.0.4}$$

$$\therefore \Sigma x = 16 \tag{2.0.5}$$

No of Green Marbles is 16
such that we have total marbles = 24
Therefore, blue marbles = 24 - 16 = 8 Marbles

3 Problem 1.2

A bag contains lemon flavoured candies only. Malini takes out one candy without looking into the bag. What is the probability that she takes out ?

1) an orange flavoured candy?
2) a lemon flavoured candy?

4 Solution 1.2

1) Let X be the random variable that denotes whether the candy taken out is lemon or orange flavoured
   If X=0, then the candy is lemon flavoured
   If X=1, then the candy is orange flavoured
   Probability of taking lemon flavoured candy = $P(L)$
   Probability of taking orange flavoured candy = $P(O)$
   The bag contains only lemon flavored candies, and nothing else. There are no orange flavored candies in the bag. Hence there is no possibility of taking out an orange candy.
   Therefore,

$$P(O) = P(X = 1) = 0 \tag{4.0.1}$$

   The probability of taking out an orange flavored candy = 0

2) The bag only contains lemon flavored candies. Therefore,

$$P(L) = P(X = 0) = 1 \tag{4.0.2}$$

   Therefore, the probability of taking out a lemon flavored candy = 1