Assignment 1

AI1110: Probability and Random Variables
Indian Institute of Techonology Hyderabad

Manohar Maripe
CS22BTECH11036

10.15.2.5: Question. 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 balls in the jar.

Answer: 8.

Solution: Given that the total number of marbles in the jar is 24.

Let, the number of Green marbles in the bag be **a** and the number of Blue marbles in the bag be **b**. So, we have

$$a + b = 24 \tag{1}$$

Let X be a Bernoulli random variable ($X \sim Bernoulli(p)$) corresponding to the colour of the marble drawn such that

$$X = \begin{cases} 1 & \text{if Green marble is drawn} \\ 0 & \text{if Blue marble is drawn} \end{cases} \tag{2}$$

$$\Pr(X = 1) = \frac{2}{3} \text{ [Given]} \tag{3}$$

Therefore

$$p = \frac{2}{3} \tag{4}$$

$$\begin{aligned} \Pr(X = 0) &= 1 - p && (5)\\ &= 1 - \frac{2}{3} \\ &= \frac{1}{3} && (6) \end{aligned}$$

We know that

$$\Pr(X = 0) = \frac{b}{a + b} \tag{7}$$

$$\frac{b}{a + b} = \frac{1}{3}$$

From equation (1)

$$\begin{aligned} \frac{b}{24} &= \frac{1}{3} \\ \implies b &= 8 && (8) \end{aligned}$$

Therefore, There are 8 Blue marbles in the jar.