

# Assignment 2

## AI1110: Probability and Random Variables

### INDIAN INSTITUTE OF TECHNOLOGY, HYDERABAD

SUVEDH  
CS22BTECH11016

**10.15.2.3:** A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball is double that of a red ball, determine the number of blue balls in the bag.

**Solution:**

Let's assume that there are  $x$  blue balls in the bag

Since there are 5 red balls in the bag and a total of  $5 + x$  balls.

Let  $\Pr(R)$  and  $\Pr(B)$  be the probabilities of drawing a red and blue ball.

(a) The probability of drawing a red ball is

$$\Pr(R) = \frac{5}{5 + x} \quad (1)$$

(b) The probability of drawing a blue ball is:

$$\Pr(B) = 2 \times \left( \frac{5}{5 + x} \right) \quad (2)$$

(c) given the probability of drawing a blue ball is double that of drawing a red ball.

We know that the sum of the probabilities of drawing a red ball and drawing a blue ball is equal to 1

$$\left( \frac{5}{5 + x} \right) + 2 \left( \frac{5}{5 + x} \right) = 1 \quad (3)$$

(4)

$$\frac{5}{5 + x} + \frac{10}{5 + x} = 1 \quad (5)$$

(6)

$$\frac{15}{5 + x} = 1 \quad (7)$$

(8)

$$5 + x = 15 \quad (9)$$

(10)

$$x = 10 \quad (11)$$

Therefore, there are 10 blue balls in the bag.