

# Assignment 1

## AI1110: Probability and Random Variables

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**10.15.1.11 Question:** Gopi buys a fish from a shop for his aquarium. The shopkeeper takes out one fish at random from a tank containing 5 male fish and 8 female fish . What is the probability that the fish taken out is a male fish?

**Solution:** There are a total of 13 fishes in the tank. Let  $f_i$  denote the  $i^{th}$  fish. Sample space of choosing a fish is

$$S = \{f_1, f_2, \dots, f_{13}\}, |S| = 13$$

Now, let  $M$  be a subset of the sample space, which denotes the event that the chosen fish is male.

$$M = \{f_i | f_i \text{ is a male fish}\}, |M| = 5$$

Let  $X$  be a random variable which takes the values 0 and 1.

$$X(i) = \begin{cases} 1, & \text{if } f_i \in M \\ 0, & \text{if } f_i \in M' \end{cases} \quad (1)$$

Probability of an event  $E$ ,  $\Pr(E)$  is defined as

$$\Pr(E) = \frac{\text{Number of outcomes favourable to event } E}{\text{Total number of outcomes}} \quad (2)$$

From (1) and (2),

$$\Pr(X = 1) = \frac{|M|}{|S|} \quad (3)$$

$$\therefore \Pr(X = 1) = \frac{5}{13} \quad (4)$$