

# Assignment 2

## AI1110: Probability and Random Variables

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### 1 [10<sup>th</sup> CBSE Probability Exercise 15.2]:

Two customers Shyam and Ekta are visiting a particular shop in the same week (Tuesday to Saturday). Each is equally likely to visit the shop on any day as on another day. What is the probability that both will visit the shop on

- (i) the same day?
- (ii) consecutive days?
- (iii) different days?

**Solution:** Let  $X, Y$  be random variables representing the day visited by Shyam and Ekta respectively. The values of random variables for each day are defined in Table I

Random Variable	Tu	W	Th	Fri	S
$X$	0	1	2	3	4
$Y$	0	1	2	3	4

TABLE I

(i) In this case, we can freely  $X$  and  $Y$  is fixed by  $X$ . We know that for any particular value of  $Y$ , the probability is  $\frac{1}{5}$ . Hence

$$\Pr(X = Y) = \frac{1}{5} \quad (1)$$

(ii) In this case

$$|X - Y| = 1 \quad (2)$$

Table II lists all possible ordered pairs of  $X, Y$ . Total number of possible pairs = 25.

$X$	0	1	2	3	4
$Y$	1	0,2	1,3	2,4	3

TABLE II

Hence,

$$\Pr(|X - Y| = 1) = \frac{8}{25} \quad (3)$$

(iii) We know that

$$\Pr(A') = 1 - \Pr(A) \quad (4)$$

Hence,

$$\Pr(X \neq Y) = 1 - \Pr(X = Y) \quad (5)$$

$$= 1 - \frac{1}{5} \quad (6)$$

$$\Pr(X \neq Y) = \frac{4}{5} \quad (7)$$