

# NCERT Assignment

EE22BTECH11052-SUJAL GUPTA

A coin is tossed two times. Find the probability of getting at most one head.

**Solution:** Define random variables  $X$  and  $Y$  as shown in Tables 1. Let the event of getting a head on one coin toss be  $A$ . Then

$$\Pr(A) = \frac{1}{2} \quad (1)$$

$X = 0$	First coin shows Tail.
$X = 1$	First coin shows Head.
$Y = 0$	Second coin shows Tail.
$Y = 1$	Second coin shows Head.

TABLE 1: Definition of  $X$  and  $Y$ .

Since the coins are fair.

$$P_{XY}(k, m) = \frac{1}{4} \quad (2)$$

where  $k$  belongs to  $\{0, 1\}$  and  $m$  belongs to  $\{0, 1\}$ . So, total four different  $k, m$  combinations. Let the event of getting a head on one coin toss be  $E$ .

$$\Pr(E) = \Pr(X + Y \leq 1) \quad (3)$$

$$= \Pr(X = 0, Y = 1) + \Pr(X = 1, Y = 0) + \Pr(X = 0, Y = 0) \quad (4)$$

$$= \frac{1}{4} + \frac{1}{4} + \frac{1}{4} \quad (5)$$

$$= \frac{3}{4} \quad (6)$$