Assignment 4

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***Abstract*—This document contains the solution to Question 23 of Exercise 15.1(Probability) in the Class 10 NCERT Textbook.**

Question: A game consists of tossing a ₹1 coin 3 times and noting its outcome each time. Hanif wins if all the tosses give the same result i.e., 3 heads or 3 tails, and loses otherwise. Calculate the probability that Hanif will lose the game.

Solution:

Let the random variable X denote the outcome of the game such that $X \in \{0, 1\}$ where,

Event	Description
$X = 0$	Hanif losing the game
$X = 1$	Hanif winning the game

TABLE I
DESCRIPTION OF EVENTS

Note: The above 2 events are mutually exclusive and exhaustive.

$$\implies \Pr(X = 0) + \Pr(X = 1) = 1 \tag{1}$$

There would be total 2^3 i.e., 8 outcomes possible of tossing a coin 3 times.

Now, Probability of Hanif winning the game i.e., all the 3 tosses resulting in either 3 Heads or 3 Tails is:

$$\Pr(X = 1) = \frac{2}{8} \tag{2}$$

$$\implies \Pr(X = 1) = \frac{1}{4} \tag{3}$$

From the equations 1 and 3, The probability of Hanif losing the game is:

$$\Pr(X = 0) = 1 - \Pr(X = 1) \tag{4}$$

$$\Pr(X = 0) = 1 - \frac{1}{4} \tag{5}$$

$$\implies \Pr(X = 0) = \frac{3}{4} \tag{6}$$

Hence, the probability that Hanif will lose the game is 0.75