Solution of question 10.15.1.23

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

Solution: A coin toss can have only two outcomes which are:

1) Heads
2) Tails

Both of these outcomes are equally likely. We can assign a random variable X such that:

Outcome	X	Probability of X
Heads	1	0.5
Tails	0	0.5

But, we have 3 coins in total. So, there can be a total of 2^3 outcomes. Hence, the total numbers of outcomes comes out to be 8.

Out of these 8 outcomes, there are 2 outcomes for:

1) All 3 coins show heads
2) All 3 coins show tails

We can use random variable Y such that:

Outcome	Y	Number of outcomes
All Heads or All Tails (wins)	0	2
Any other outcome (loses)	1	6

$$P(event) = \frac{\text{Number of favourable outcomes}}{\text{Number of total outcomes}} \tag{1}$$

$$P(Y) = \frac{\text{Number of outcomes in which he loses}}{\text{Number of total outcomes}} \tag{2}$$

$$= \frac{6}{8} \tag{3}$$

$$= \frac{3}{4} \tag{4}$$

$$= 0.75 \tag{5}$$

Hence, the probability of Hanif losing the game is 0.75.