Assignment 1
AI1110: Probability and Random Variables
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CBSE Probabaility Grade 10

Example 22

Question: A person plays a game of tossing a coin thrice. For each head, he is given Rs 2 by the organiser of the game and for each tail, he has to give Rs 1.50 to the organiser. Let X denote the amount gained or lost by the person. Show that X is a random variable and exhibit it as a function on the sample space of the experiment.

Solution: X is a number whose values are defined on the outcomes of a random experiment. Therefore, X is a random variable.

Now, sample space of the experiment is:

S = HHH, HHT, HTH, THH, HTT, THT, TTH, TTT

$$\therefore$$

$$X(HHH) = 3 \times Rs2 = Rs6 \tag{1}$$
$$X(HHT) = X(HTH) = X(THH)$$
$$= 2 \times Rs2 - Rs1.5 = Rs2.5 \tag{2}$$
$$X(HTT) = X(THT) = X(TTH)$$
$$= Rs2 - 2 \times Rs1.5 = -Rs1 \tag{3}$$
$$X(TTT) = 3 \times Rs(-1.5) = -Rs4.5 \tag{4}$$

Minus sign indicates a loss to the player. Thus, for each element of the sample space, X takes a unique value, hence, X is a function on the sample space.

Range of X is $[-4.5, -1, 2.5, 6]$