Assignment 14

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1 QUESTION NO. 6.17

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.

2 SOLUTION

Axiom 2.1. *A random variable X is a real-valued function whose domain is sample space S .*

Let head and tail of coin be denoted by H and T respectively.

∴ Sample space for tossing a coin thrice is

$$S = \{HHH, HHT, HTH, THH, \tag{2.0.1}$$

$$TTH, THT, HTT, TTT\} \tag{2.0.2}$$

According to the question,X is the amount gained or lost by the person.

	X
$X(HHH)$	2+2+2=6
$X(HHT)$	2+2-1.5=2.5
$X(HTH)$	2-1.5+2=2.5
$X(THH)$	-1.5+2+2=2.5
$X(TTH)$	-1.5-1.5+2=-1
$X(THT)$	-1.5+2-1.5=-1
$X(HTT)$	2-1.5-1.5=-1
$X(TTT)$	-1.5-1.5-1.5=-4.5

TABLE 2.1: Values of X

From table 2.1,

$$X = \{6, 2.5, -1, -4.5\} \tag{2.0.3}$$

∵ All values of X are real.
∴ According to axiom 2.1,X is a random variable.