Assignment 14

K.A. Raja Babu

Download latex-tikz code from

https://github.com/ka−raja−babu/Matrix−Theory/tree/main/Assignment14

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.

$\therefore$ 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 such that

$$\text{Each } H = \text{Rs } 2 \tag{2.0.3}$$
$$\text{Each } T = -\text{Rs } 1.5 \tag{2.0.4}$$

	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,

$$X = \{6, 2.5, -1, -4.5\} \tag{2.0.5}$$

$\because$ All values of X are real.
$\therefore$ According to axiom 2.1,X is a random variable.