Assignment 1

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Download all python codes from

https://github.com/srikaran-p/AI1103/tree/main/Assignment1/codes

and latex codes from

https://github.com/srikaran-p/AI1103/tree/main/Assignment1

Problem

(Prob 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.

Solution

Let Ω be the sample space,

$$\Omega = \{\{T,T,T\},\{T,T,H\},\{T,H,T\},\{T,H,H\},\{H,T,T\},\{H,T,H\},\{H,H,T\},\{H,H,H\}\}$$

Let c be the number of heads in an event in Ω,

$$X = 2c - 1.5(3-c)$$
$$X = 3.5c - 4.5$$
$$X = \begin{cases} -4.5 & \text{if } c = 0 \\ -1 & \text{if } c = 1 \\ 2.5 & \text{if } c = 2 \\ 6 & \text{if } c = 3 \end{cases}$$

The value of X is dependent on the value of c. As the value of c is probabilistic in nature, it is a random variable. As c is a random variable, we can say that X is a random variable. □

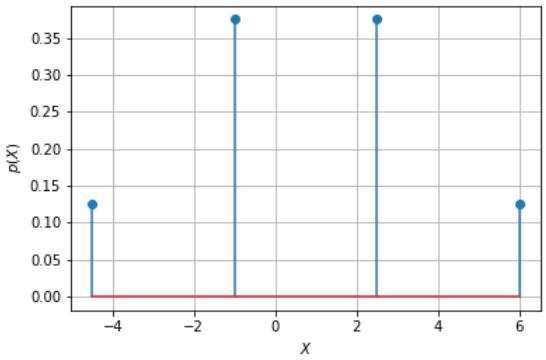

Fig. 0: Plot of probability of X against X