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.
Let X_0 be a random variable where, $X_0 \in \{2, -1.5\}$

$$X_1 = X_0 + Y \tag{0.0.1}$$

$$X_2 = X_1 + Y \tag{0.0.2}$$

Here, $Y \in \{2, -1.5\}$. X_1, X_2, Y are random variables.

$$X = X_2 \tag{0.0.3}$$

The value of X is obtained from a random process. So, X is a random variable.
Let c be the number of heads.

$$c = \frac{(X_0 + 1.5)}{3.5} + \frac{(Y + 1.5)}{3.5} + \frac{(Y + 1.5)}{3.5} \tag{0.0.4}$$

Y in eqs. (0.0.1) and (0.0.2) can have different values.
We can relate X with c,

$$X = 2c - 1.5(3 - c) \tag{0.0.5}$$

$$X = 3.5c - 4.5 \tag{0.0.6}$$

c	X
0	-4.5
1	-1
2	2.5
3	6

□

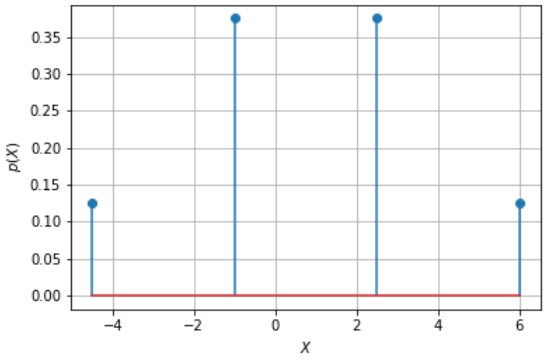

Fig. 0: Plot of probability of X against X