

Assignment 14

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Download all python codes from

<https://github.com/ka-raja-babu/Matrix-Theory/tree/main/Assignment14>

and latex-tikz codes from

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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

Let X_1, X_2, X_3 be the three tosses of the coin and X be the total amount such that

$$X = X_1 + X_2 + X_3 \quad (2.0.1)$$

where

$$X_i = \{2, -1.5\} \quad (2.0.2)$$

\therefore Tossing a coin three times follows binomial distribution .

\therefore X follows binomial distribution .

Now, assuming a fair coin, the probability mass function of X is given by

$$p_X(k) = {}^nC_k p^k (1-p)^{n-k} \quad (2.0.3)$$

where

$$n = 3, p = \frac{1}{2}, k = 0, 1, 2, 3 \quad (2.0.4)$$

For $k \in \{0, 1, 2, 3\}$, value of X is given by

$$X = x \in \{-4.5, -1, 2.5, 6\} \quad (2.0.5)$$

So

$$\Pr(X = x) = p_X(k) \quad (2.0.6)$$

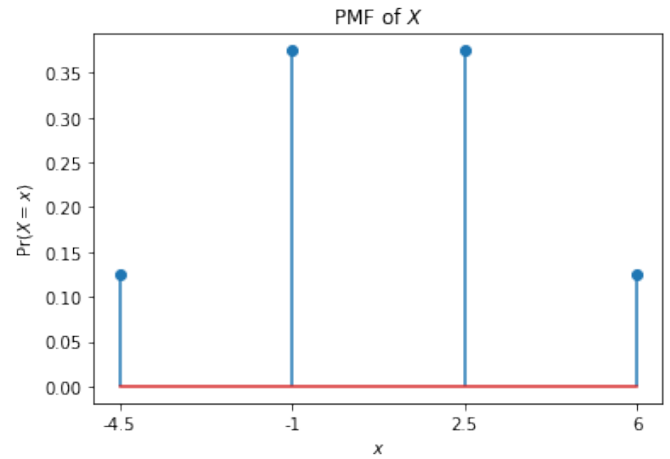


Fig. 2.1: PMF of X