

# Assignment 11-Probability and Random Variable

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**Download latex code from here-**

[https://github.com/annu100/AI5002-Probability-and-Random-variables/tree/main.tex/ASSIGNMENT\\_11](https://github.com/annu100/AI5002-Probability-and-Random-variables/tree/main.tex/ASSIGNMENT_11)

**Download python code from here-**

[https://github.com/annu100/AI5002-Probability-and-Random-variables/tree/main.py/ASSIGNMENT\\_11](https://github.com/annu100/AI5002-Probability-and-Random-variables/tree/main.py/ASSIGNMENT_11)

## I. PROBLEM STATEMENT-GATE 6

The probability of getting a "head" in a single toss of a biased coin is 0.3. The coin is tossed repeatedly till a "head" is obtained. If the tosses are independent, then the probability of getting "head" for the first time in the fifth toss is .....

## II. SOLUTIONS

Probability for getting head=0.3

let H denotes the event of getting head in one toss and T denotes the event of getting tail in one toss.

$$Pr(H)=0.3$$

$$Pr(T)=1-0.3=0.7$$

Since all trials are independent, so probability for getting first head in fifth toss will be multiplication of first four tails occurring probability and one head occurring probability.

If X denotes the required event, then it can be written as

$$X=TTTTH$$

the probability of getting "head" for the first time in the fifth toss is

so, required probability is given by

$$\begin{aligned} Pr(X) &= 0.7 \times 0.7 \times 0.7 \times 0.7 \times 0.3 \\ &= 0.07203. \end{aligned}$$

Therefore, Required Probability = 0.07203.

## III. SIMULATIONS

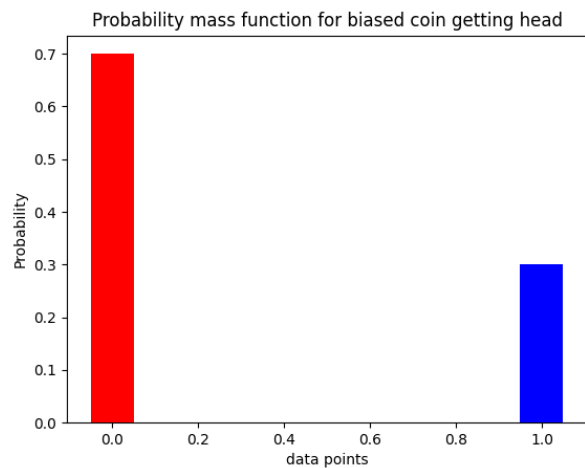


Figure 1: probability mass function

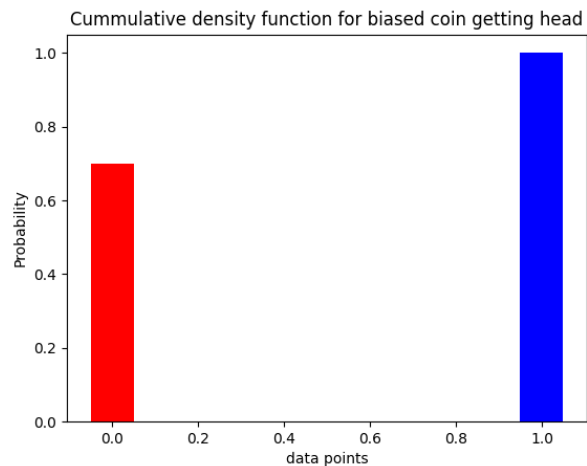


Figure 2: Cummulative mass function

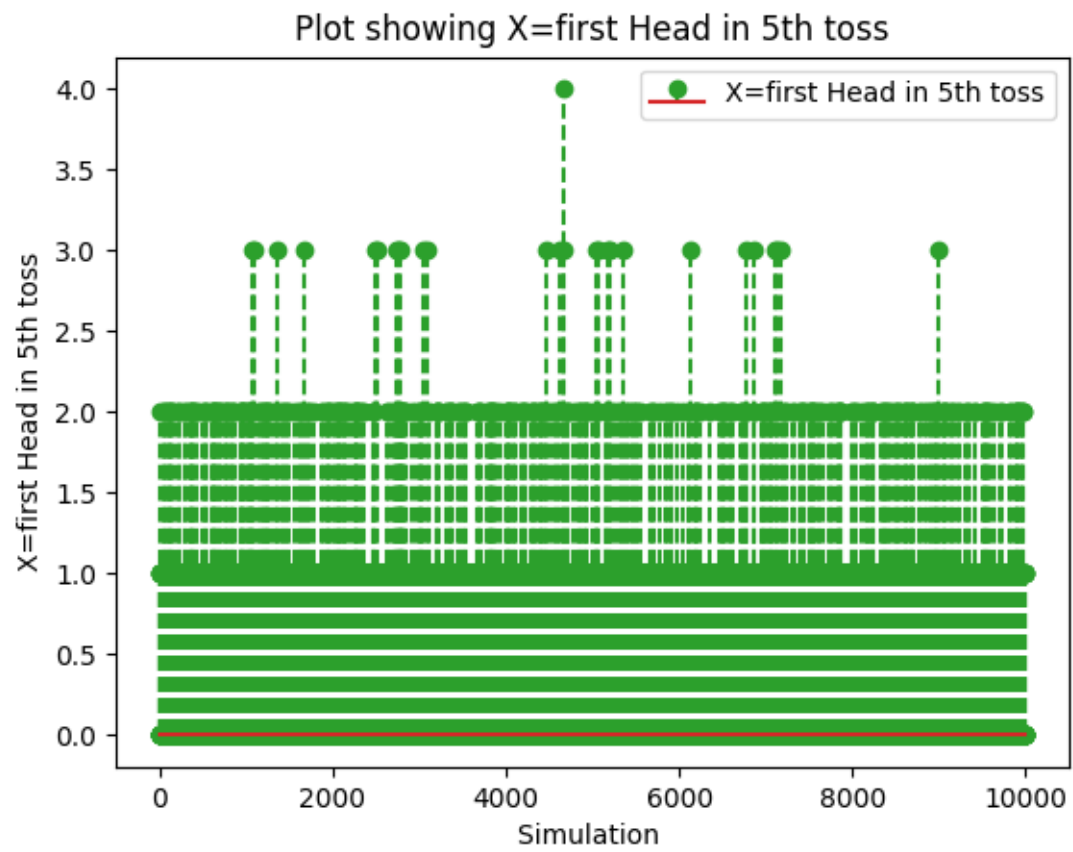


Figure 3: getting first head in fifth trial