

Assignment 4-Probability and Random Variable

Annu-EE21RESCH01010

Download latex code from here-

https://github.com/annu100/AI5002-Probability-and-Random-variables/tree/main/ASSIGNMENT_4

download python code from here

https://github.com/annu100/AI5002-Probability-and-Random-variables/blob/main/ASSIGNMENT_4/assignment_4.py

head is more than 90%

$$Pr(X \geq 1) = 1 - Pr(X = 0) \quad (5)$$

$$= 1 - {}^nC_0 0.5^0 0.5^{n-0} > 0.9 \quad (6)$$

$$= 1 - \left(\frac{1}{2}\right)^n > 0.9 \quad (7)$$

$$= \left(\frac{1}{2}\right)^n < 0.1 \quad (8)$$

$$= 2^n > 10 \quad (9)$$

This implies $n \geq 4$

Therefore, the required number of trials must be greater than or equal to 4. From graph, we can also see

I. PROBLEM STATEMENT-PROBLEM 3.10

How many times must a man toss a fair coin so that the probability of having at least one head is more than 90 %?

II. SOLUTIONS

Let r be the number for getting no. of heads.
let n = total no. of times a coin is tossed
therefore, $q=1-p$, which is probability of getting a tail. Since it is the case of fair coin, therefore $p=0.5$ and $q=0.5$

$$p = \frac{1}{2} \quad (1)$$

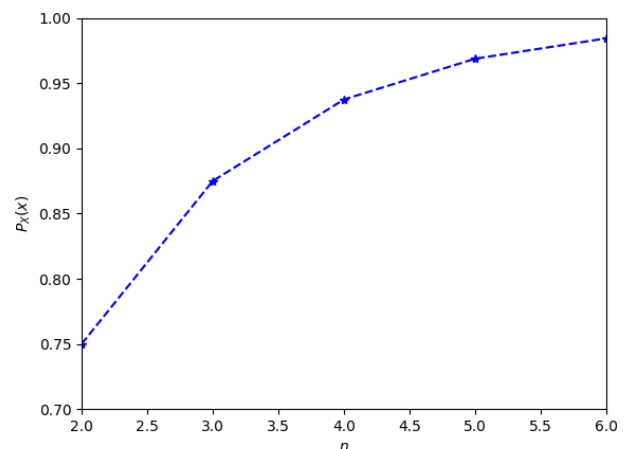
$$q = 1 - \frac{1}{2} = \frac{1}{2} \quad (2)$$

From Bernoulli's distribution, we know

$$Pr(X = r) = {}^nC_r p^r q^{n-r} \quad (3)$$

$$X \sim \text{Bin}(n, p = 0.5) \quad (4)$$

number of trials versus Bernoulli probability graph for getting at least one head



Above is the graph of no. of trials versus probability

We are required to find the number of trials such that the sample probability of having at least one