

AI1103 ASSIGNMENT 3

Name:MANNAM SARANDEEP,Rollno:CS20BTECH11030

Download the python code from

<https://github.com/sarandeepmannam/AI1103-ASSIGNMENT-3/blob/main/ASSIGNMENT3.py>

and latex-tikz code from

<https://github.com/sarandeepmannam/AI1103-ASSIGNMENT-3/blob/main/AI1103%20ASSIGNMENT3.tex>

1 QUESTION-GATE CS 2004 25

If a fair coin is tossed four times, what is the probability that two tails and two heads will result?

2 SOLUTION-GATE CS 2004 25

Given question is a binomial distribution in which no of trials $n = 4$.

Let's assume a trail is succeeded if the coin turns out to be head. Since it is a fair coin probability of success is $p = 0.5$

Let X be the binomial random variable of this distribution. So $X \in \{0, 1, 2, 3, 4\}$, 0 represents 0 heads, 1 represents 1 head, 2 represents 2 heads, 3 represents 3 heads and 4 represents 4 heads in 4 trails.

From binomial distribution,

$$\Pr(\mathbf{X=r}) = {}^nC_r p^r q^{n-r} \quad (2.0.1)$$

$$= {}^nC_r p^r (1 - p)^{n-r} \quad (2.0.2)$$

Probability of getting two heads and two trails will be,

$$\Pr(\mathbf{X=2}) = {}^4C_2 \times (0.5)^2 \times (1 - 0.5)^2 \quad (2.0.3)$$

$$= 6 \times \left(\frac{1}{4}\right) \times \left(\frac{1}{4}\right) \quad (2.0.4)$$

$$= \frac{3}{8} \quad (2.0.5)$$

$$= 0.375 \quad (2.0.6)$$

Hence, the required probability is 0.375.