AI1103 ASSIGNMENT 3

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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 trails $n = 4$.
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,

$$\Pr(\mathbf{X=r}) = {}^{n}C_{r} p^{r} q^{n-r} \tag{2.0.1}$$
$$= {}^{n}C_{r} p^{r} (1-p)^{n-r} \tag{2.0.2}$$

Probability of getting two heads and two trails will be,

$$\Pr(\mathbf{X=2}) = {}^{4}C_{2} \times (0.5)^{2} \times (1-0.5)^{2} \tag{2.0.3}$$
$$= 6 \times (\frac{1}{4}) \times (\frac{1}{4}) \tag{2.0.4}$$
$$= \frac{3}{8} \tag{2.0.5}$$
$$= 0.375 \tag{2.0.6}$$

Hence,the required probability is 0.375.