AI1103 - Assignment 1

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Download all python codes from

https://github.com/CS20BTECH11004/AI1103/tree/main/Assignment%201/codes

and latex-tikz codes from

https://github.com/CS20BTECH11004/AI1103/blob/main/Assignment%201/Assignment%201.tex

1 Question

(Probman 1.9) In an examination, 20 questions of true-false type are asked. Suppose a student tosses a fair coin to determine his answer to each question. If the coin falls heads, he answers 'true'; if it falls tails, he answers 'false'. Find the probability that he answers at least 12 questions correctly.

2 Solution

Let X be the number of correct answers
n be the number of questions ($n = 20$)
p is the probability of correct answer ($p = 0.5$)
q is the probability of wrong answer ($q = 1 - p$)
From Bernoulli's distribution,

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

$\therefore$ required probability is

$$\Pr(X \geq 12) = \sum_{r=12}^{n} {}^{n}C_{r} p^{r} q^{n-r} \tag{2.0.2}$$

$$= \sum_{r=12}^{20} {}^{20}C_{r} p^{r} (1-p)^{20-r} \tag{2.0.3}$$

$$= 0.25172233581 \tag{2.0.4}$$