AI1103 - Assignment 1

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1 QUESTION

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 answer ($X \in \{0, 1, 2, ..., 20\}$). Let p be the probability of getting the answer correct and q be the probability of getting the answer wrong. $q = 1 - p$ and $p = q = 0.5$

$$\Pr(X \geq 12)$$

$$= \sum_{r=12}^{20} {}^{20}C_r p^r q^{20-r} \qquad (2.0.1)$$

$$= \sum_{r=12}^{20} {}^{20}C_r p^r (1 - p)^{20-r} \qquad (2.0.2)$$

$$= 0.25172233581 \qquad (2.0.3)$$

The following situation can be represented by a binomial distribution where $n = 20$ and $p = 1/2$