

AI1110 Assignment 1

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11.16.3.11: In a lottery, a person chooses six different natural numbers at random from 1 to 20, and if these six numbers match with the six numbers already fixed by the lottery committee, he wins the prize. What is the probability of winning the prizes in the game? [Hint : order of the numbers is not important.]

Solution:

To calculate the probability of winning the prize, we need to first determine the total number of possible combinations that can be formed by choosing six numbers out of 20.

The formula for calculating the number of combinations is:

$$\binom{n}{r} = \frac{n!}{r!(n-r)!} \quad (1)$$

Where n is the total number of items, r is the number of items to choose. In this case, $n = 20$ and $r = 6$, so we have:

$$\binom{20}{6} = \frac{20!}{6!(20-6)!} = 38,760 \quad (2)$$

So there are 38,760 possible combinations of six numbers that can be chosen from 20.

Since order does not matter, the number of winning combinations is simply 1, since there is only one set of six numbers chosen by the lottery committee.

Therefore, the probability of winning the prize is:

$$\frac{1}{\binom{20}{6}} = \frac{1}{38,760} = 0.0000258 \quad (3)$$

So the probability of winning the prize is very low, it is approximately 0.00258%.