

Sample Solution

Binomial Coefficient

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Exercise

What is the probability of getting 7 correct numbers in a lotto ticket (playing one row only)?

The draw selects 7 random numbers out of a pool of 34 numbers. You need to start by calculating the number of possible 7-sets that can be drawn.

Mathematical formulation

$$P = \{1, 2, \dots, 34\}$$

$$S \subset P, \quad |S| = 7$$

How many 7-sets exist in P ?

Solution

The number of k -sets in an n -set is given by the binomial coefficient

$$\binom{n}{k} = \frac{n!}{k!(n-k)!}$$

$$\binom{34}{7} = \frac{34!}{7!27!} = \frac{34 \cdot 33 \cdot 32 \cdot 31 \cdot 30 \cdot 29 \cdot 28}{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}$$

$$= \frac{34 \cdot 11 \cdot 16 \cdot 31 \cdot 29}{1} \approx 5.38 \cdot 10^6$$

$$\text{Probability is } \frac{1}{34 \cdot 11 \cdot 16 \cdot 31 \cdot 29}$$