Definition: Population and sample

The overall group of objects about which conclusions are to be drawn is called the *population*. A subset or portion of the population that is actually obtained and that is used to draw conclusions about the population is called a *sample*.

Relative Frequency Approximation

$$P[A] \approx \frac{f}{n} = \frac{\text{number of times event } A \text{ occurred}}{\text{number of times experiment was run}}$$

Classical Formula

$$P[A] = \frac{n(A)}{n(S)} = \frac{\text{number of ways } A \text{ can occur}}{\text{number of ways the experiment can proceed}}$$

Definition 1.2.1: Sample space and sample point

A sample space for an experiment is a set S with the property that each physical outcome of the experiment corresponds to exactly one element of S. An element of S is called a sample point.

Definition 1.2.2: Event

Any subset A of a sample space S is called an event. The emptyset $\emptyset$ is called the *impossible* event; the subset S is called the *certain* event.

Definition 1.2.3: Mutually exclusive events

Two events A_1 and A_2 are mutually exclusive if and only if $A_1 \cap A_2 = \emptyset$. Events $A_1, A_2, A_3, \ldots$ are mutually exclusive if and only if $A_i \cap A_j = \emptyset$ for $i \neq j$.

Multiplication principle

Consider an experiment taking place in k stages. Let n_i denote the number of ways in which stage i can occur for $i = 1, 2, \ldots, k$. Altogether the experiment can occur in

$$\prod_{i=1}^{k} n_i = n_1 \cdot n_2 \cdots n_k$$

ways.

Theorem 1.3.1: Counting permutations

The number of permutations of n distinct objects used r at a time, denoted by ${}_nP_r$, is

$${}_nP_r = \frac{n!}{(n-r)!}$$

Theorem 1.3.2: Counting combinations

The number of combinations of n distinct objects selected r at a time, denoted by ${}_nC_r$ or $\binom{n}{r}$, is given by

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

Notera sambandet ${}_nP_r = {}_nC_r \cdot r!$