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An Overview of Number System

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Perspective

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DESCRIPTION

A numeral system (or system of numeration) is a writing system for expressing numbers; it is a mathematical notation for consistently representing numbers in a set using digit or other symbols.

In various numeral systems, the same sequence of symbols might indicate different numbers. The number eleven in the decimal numeral system (as used in everyday life), the number three in the binary numeral system (as used in computers), and the number two in the unary numeral system are all represented by "11." (E.g. used in tallying scores).

The value of a numeral is the number it represents. Not all number systems can represent all of the numbers that are used today; for example, Roman numerals do not contain a zero.

A numeral system should, in theory, be able to represent a usable set of numbers (e.g. all integers, or rational numbers). It assigns a unique representation to each integer represented (or at least a standard representation). It reflects the numbers' algebraic and mathematical structure.

Main Numeral Systems

The unary numeral system is the most basic, in which each natural number is represented by a certain number of symbols. For example, if the sign '/' is used, the number seven is represented by '/'. Tally markings are an example

of a system that is still in use today. Although it is significant in theoretical computer science, the unary system is only usable for tiny numbers. Elias gamma coding expresses arbitrary-sized numbers by utilizing unary to represent the length of a binary numeral, which is often employed in data compression.

Different symbols for specific new values can be introduced to shorten the unary notation. These values are frequently powers of ten; for example, if ''/'' represents one, ten, and + represents one hundred, the number 304 can be compactly expressed as ''+++ /'' and the number 123 as ''+ /'' without the requirement for a zero. Sign-value notation is the term for this. This was the case with the ancient Egyptian numeric system, and the Roman numeral system was based on it.

Even more useful are systems that utilize specific abbreviations for symbol repeats; for example, one may write C+ D/ for the number 304 using the first nine letters of the alphabet, with A standing for "one occurrence," B for "two occurrences," and so on. When printing Chinese numbers and other East Asian numerals based on Chinese, this approach is employed. The English language's number system ("three hundred and four"), as well as that of other spoken languages, is of this sort, independent of the written systems they use.

A positional system, often known as place-value notation, is more elegant. Working in base 10, ten separate digits are utilized, with the location of a digit indicating the power of ten with which the digit is to be multiplied, as in 304 =3100+ 010+41, or more exactly 3102+0101+4100. The number zero, which is not required in other systems, is critical here in order to "skip" a power. The Hindu–Arabic numeral system is a positional base 10 system that originated in India and is now used all over the world

Arithmetic is easier in positional systems than in additive systems; additionally, additive systems require a huge number of distinct symbols for different powers of ten, but a positional system only requires ten different symbols (assuming that it uses base 10).

In human writing, the positional decimal system is now widely employed. By grouping the digits and treating a series of three decimal digits as a single digit, the base 1000 is also utilized. This is the meaning of the popular notation for very big numbers of 1,000,234,567.