DEFINITIONS

This section provides simple definitions for terms presented and discussed regarding the arithmetic, mathematics, and geometry of omnifinite number systems.

absolute infinity refers to a known largest positive nonfinite number in a closed number system. Sometimes, this is referred to as positive absolute infinity. While this number can be reduced arithmetically, it cannot be increased or exceeded. This number is the infinity of all infinities. See negative absolute infinity.

closed number system refers to an ordered numerical system that has both a known nonpositive and nonnegative number, zero, and a known largest positive number and largest negative number in addition to specified numbers between them. Arithmetic is fully defined for closed systems like omnifinites. See omnifinites.

complete omnifinite system refers to a closed number system consisting of all finite and nonfinite numbers, including all infinitesimals and infinites.

finite number refers to a real number that is nonfinite. Examples include $^{-}1009$, $^{-}101$, $^{-}4.431$, ^{-}e, $^{-}1$, 0, 1.06, e, π, 321.4, 1145.019, and so forth.

infinity refers to a number often used in complete omnifinite systems that is natural countable infinity, ∞, meaning 1, 2, 3, ..., ∞, which are closed number systems. Generally, in mathematics, infinity is regarded as a concept and not a number even though often times is used as a number such as in integrals, limits, summation and so forth.

lemniscate notation refers to number systems, such as omnifinites, which use the symbol for infinity, ∞, as originally specified by Prof. Dr. John Wallis for all nonfinite numbers. Sometimes this is referred to as lemniscate notational numbers or numbering. Infinitesimals are specified by a number multiplied by ∞ with a negative exponent, whereas infinities are specified by a number multiplied by ∞ with a positive exponent. Finites may be represented this way as well but ∞ has an exponent of zero.

negative absolute infinity refers to a known largest negative nonfinite number in a closed number system. While this number can be increased arithmetically, it cannot be decreased. This number is the negative infinity of all negative infinities. See absolute infinity.

nonfinite number refers to a nonreal number that may be an infinitesimal and/or an infinite. Examples of nonfinite numbers include $^{-}7.12\infty^{-5}$, $^{-}3.9\infty^{-1.2}$, $^{-}5\infty^{-1}$, $^{-}4.12\infty^{0.45}$, $\infty^{0.2}$, $\infty^{0.5}$, ∞, $2\infty^{2}$, $4.21\infty^{3.1}$, and so forth. Examples of mixed nonfinite numbers include $^{-}2.1\infty + 7\infty^{-5}$, $3.1\infty - 4.1\infty^{-0.4}$, $9\infty^{2} - \infty^{1.4} + 5\infty^{-4}$, and so forth. Numbers may be nonimaginary and/or imaginary.

omnifinite number system refers to numerically and geometrically closed number system. All arithmetic is fully defined. See omnifinites.

omnifinite refers to an ordered closed number system that uses lemniscate notation for all nonfinite numbers, where ∞ refers to natural countable infinity, meaning 1, 2, 3, …, ∞, and all geometric objects have size. See closed number system. In a complete omnifinite closed number system, all numbers are present and may be mathematically manipulated. In a closed number system, a known number must be specified that represents the smallest possible magnitude of a number such as zero and known numbers, that are the largest positive and negative numbers, must also be specified.

nonomnifinite refers to a number that is part of open number system such as the reals, hyperreals, transfinites, surreals, or transreals. Arithmetic is not fully defined but is mostly defined.

nonomnifinite number system refers to numerically and geometrically open number system such as the reals, hyperreals, transfinites, surreals, or transreals. Arithmetic cannot be fully defined. See nonomnifinites.

open number system refers to an ordered numerical system that has only a specified known nonpositive and nonnegative number, zero, and other numbers but no known or specified upper nor lower limiting number. Arithmetic is only partially but mostly defined. Errors will result in instances which cannot be eliminated due to the nature of the incomplete system. Examples of open number systems include all known number systems, except omnifinites, such as reals, complex numbers, ordinals, hyperreals, complex hyperreals, surreals, and so forth.

special number refers to a number that has additional properties not shared by all other numbers including but not limited to additive self identity and multiplicative self magnitude identity properties. For a complete omnifinite number system, special numbers include zero as well as positive and negative absolute infinities.

ORDER OF OPERATIONS

All calculators created and developed by **infinicore technologies** follow **PEMDAS** for the arithmetic order of operations when performing numerical calculations. The order of **PEMDAS** is as follows.

- **P**arentheses or brackets
- **E**xponents or powers
- **M**ultiplication and **D**ivision – whatever comes first from left to right
- **A**ddition and **S**ubtraction – whatever comes first from left to right

Note, with **PEMDAS**, there is no "implicit" multiplication. There is just multiplication from left to right as shown by the following example.

$$8 \div 2(1 + 3) = 8 \div 2(4) = 8 \div 2 \times 4 = 4 \times 4 = 16$$