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## NaN

In computing, NaN, which stands for Not a Number, is a value or symbol that is usually produced as the result of an operation on invalid input operands. For example, most floating-point units are unable to explicitly calculate the square root of negative numbers, and will instead indicate that the operation was invalid and return a NaN result.

An invalid operation is not the same as an arithmetic overflow (which returns a positive or negative infinity). Arithmetic operations involving NaN always produce NaN , allowing the value to propagate through a calculation so that errors can be detected at the end without extensive testing during intermediate stages.

A NaN does not compare equal to any number or NaN. You can therefore test whether a variable has a NaN value by comparing it to itself, thus if $x==x$ gives false ( 0 ) then $x$ is a NaN code.

## How is a NaN created?

There are three kinds of operation which return NaN :

1. Operations with a NaN as at least one operand
2. Indeterminate forms

- The divisions $0 / 0, \infty / \infty, \infty /-\infty,-\infty / \infty,-\infty /-\infty$
- The multiplications $0 \times \infty$ and $0 \times-\infty$
- The power $1^{\wedge} \infty$
- The additions $\infty+(-\infty),(-\infty)+\infty$ and equivalent subtractions.

3. Real operations with complex results

- The square root of a negative number
- The logarithm of a negative number
- The tangent of an odd multiple of 90 degrees (or $\pi / 2$ radians)
- The inverse sine or cosine of a number which is less than -1 or greater than +1 .


## NaN in Tables

In MagicPlot NaN also is used to represent empty cells in tables.
Statistical functions ignores NaN values in tables.

## NaN in Expressions

You can use a predefined constants NaN , nan or NAN in expressions to indicate NaN value.

## Examples

| Expression | Result |
| :--- | :--- |
| $0^{\wedge} 0$ | 1 |
| $0 / 0$ | NaN |
| sqrt ( -1$)$ | NaN |
| $1 / 0$ | Infinity |
| $-1 / 0$ | - Infinity |

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