

C47 Ref page : CONVg param -- CONVg? (Convergence?) in menu [TEST.1] gF6 : Test convergence of X and Y using binary coded parameter for comparison mode and special numbers ; tolerance is derived from setting SDIGS

Comparison

relative

absolute

0	0	0	0
0	0	1	1

Infinity

$\pm\infty$ not convergent

$\pm\infty$ convergent

0	0	0	0
0	2	0	2

NaN

NaN not convergent

NaN convergent

0	0	0	0
4	0	0	4

NaN | Infinity | Comparison

NaN not convergent | $\pm\infty$ not convergent | relative
 NaN not convergent | $\pm\infty$ not convergent | absolute
 NaN not convergent | $\pm\infty$ convergent | relative
 NaN not convergent | $\pm\infty$ convergent | absolute
 NaN convergent | $\pm\infty$ not convergent | relative
 NaN convergent | $\pm\infty$ not convergent | absolute
 NaN convergent | $\pm\infty$ convergent | relative
 NaN convergent | $\pm\infty$ convergent | absolute

0	0	0	0
0	0	1	1
0	2	0	2
0	2	1	3
4	0	0	4
4	0	1	5
4	2	0	6
4	2	1	7

NaN

NaN not convergent
 NaN not convergent
 NaN not convergent
 NaN not convergent
 NaN convergent
 NaN convergent
 NaN convergent
 NaN convergent

Infinity

$\pm\infty$ not convergent
 $\pm\infty$ not convergent
 $\pm\infty$ convergent
 $\pm\infty$ convergent
 $\pm\infty$ not convergent
 $\pm\infty$ not convergent
 $\pm\infty$ convergent
 $\pm\infty$ convergent

Comparison

relative
 absolute
 relative
 absolute
 relative
 absolute
 relative
 absolute

CONVG? → Z would pull the CONVg argument from Z instead of using the argument directly ;

So if Z contained 0, CONVg →Z would act like CONVg 0

The absolute difference between a and b is $\text{abs}(a-b)$. As floating point numbers have only limited number of significant digits, with large absolute values you may never see an absolute difference as small as your tolerance which defaults to be $1e-32$.

Relative difference does not depend on the magnitude of the compared values, i.e. the difference is considered $\text{abs}(a - b) / a$ which means the difference is now always in range of the tolerance.

Example: if $\text{tol} = 1e-32$, and $a=2+1e33$ and $b=1+1e33$ (on the limit of accuracy) then:

Absolute mode: $\text{abs}(a-b) = 1$ and it does not converge as $1 \gg 1e-32$

Relative mode: $\text{abs}(a-b)/a = 9.999...e-34$ therefore it does converge.

So we must per default use Relative mode, with NaN and with infinities NOT converging, therefore parameter 0 should be the user's goto value unless he needs specialist behaviour.

Practical example:

2 SDIGS 1000 ENTER 1001 CONVg? 0 results in true (relative)

2 SDIGS 1000 ENTER 1001 CONVg? 1 results in false (absolute)

Or illustrating the indirect parameter:

2 SDIGS 1 ENTER 1000 ENTER 1001 CONVg? → Z results in false

2 SDIGS 0 STO 00 1000 ENTER 1001 CONVg? → 00 results in true

2 SDIGS 1 STO 00 1000 ENTER 1001 CONVg? → 00 results in false

(paraphrased and modified from here:

<https://stackoverflow.com/questions/70657424/what-is-meant-by-a-relative-comparison-and-an-absolute-comparison>)