

NaN	Infinity	Comparison
4	2	1

0
1

0
1

0
1

		1
	1	
	1	1
1		
1		1
1	1	
1	1	1

CONVG?

- Comparison
0 relative
1 absolute

0	0	0	0
0	0	1	1

- Infinity
0 ±∞ not convergent
2 ±∞ convergent

0	0	0	0
0	2	0	2

- NaN
0 NaN not convergent
4 NaN convergent

0	0	0	0
4	0	0	4

- NaN | Infinity | Comparison
0 NaN not convergent | ±∞ not convergent | relative
1 NaN not convergent | ±∞ not convergent | absolute
2 NaN not convergent | ±∞ convergent | relative
3 NaN not convergent | ±∞ convergent | absolute
4 NaN convergent | ±∞ not convergent | relative
5 NaN convergent | ±∞ not convergent | absolute
6 NaN convergent | ±∞ convergent | relative
7 NaN convergent | ±∞ 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 | Infinity | Comparison |
|--------------------|-------------------|------------|
| NaN not convergent | ±∞ not convergent | relative |
| NaN not convergent | ±∞ not convergent | absolute |
| NaN not convergent | ±∞ convergent | relative |
| NaN not convergent | ±∞ convergent | absolute |
| NaN convergent | ±∞ not convergent | relative |
| NaN convergent | ±∞ not convergent | absolute |
| NaN convergent | ±∞ convergent | relative |
| NaN convergent | ±∞ convergent | 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 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>)