

NAME

approx – Compare numbers in two approximately equal files.

SYNOPSIS

`${HOME}/bin/exe/approx [tolerance]`

DESCRIPTION

It is sometimes of interest to compare computational results produced by different algorithms or by different implementations of the same algorithm, especially when there is reason to expect that the results will be identical within roundoff. Often such results consist of lines of numbers written in files. If two files contain lines of numbers having the same arrangement, this program can be used to compare them.

The program begins by attaching A and B input files and a differences file that will list the disagreements between A and B. Then it looks for a run-line parameter specifying the maximum amount by which corresponding numbers in A and B can differ and still be considered close enough; if no tolerance parameter is given it uses a tolerance of 10^{-9} . Then the program reads a line from A and a line from B, and computes the absolute difference between corresponding tokens. If the two lines contain different numbers of tokens, the program reports that fact and stops. If the absolute difference exceeds the tolerance it records that fact in the differences file. Then it goes for the next pair of input lines, until the end of A or B is reached; if both files don't end after the same line, the program reports that the files are of different lengths. Finally, the program reports either the number of significant differences recorded in the differences file or that the A and B files compared equal within the specified tolerance.

OPTIONS

The difference tolerance is a number and can be given in any form acceptable to READ, or it can be omitted if the default value is suitable.

UNITS and FILES

- 0 prompts and error messages
- 1 input file A
- 2 input file B
- 3 output file listing differences out of tolerance
- 5 responses read from the keyboard
- 6 results and informational messages

SEE ALSO

Numerous programs are available for finding the typographical differences between files, but those differences might not be numerically significant.

DIAGNOSTICS

If corresponding lines of A and B have different numbers of tokens, the program reports that fact and stops. If the files have different numbers of lines, the program reports that fact.

AUTHOR

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EXAMPLE

```
unix[1] cat A
1 2 3
4 5 6
unix[2] cat B
1.1 2.1 2.9
4 5 6
unix[3] approx 1=A 2=B 3=diffs 0.0
using difference tolerance 0.000000D+00
differences file lists          3 differences, largest difference 1.000000E-01
unix[4] cat diffs
line          1 tokens 1 differ by -1.000000E-01
line          1 tokens 2 differ by -1.000000E-01
line          1 tokens 3 differ by 1.000000E-01
unix[5] approx 1=A 2=B 3=diffs 0.5
The file "diffs" is to be written, but it exists; ok? yes
using difference tolerance 5.000000D-01
files compared equal within tolerance,          2 lines, largest difference 1.000000E-01
unix[6] cat diffs
unix[7]
```

The entries on line 1 of file A differ by 0.1 from those on line 1 of file B. Comparing them with zero tolerance reveals the three differences on line 1; comparing them with a tolerance of 0.5 makes the two files compare equal.