B4- Mathematics

B-MAT-400

206neutrinos

No mean task here...

Neutrinos

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binary name:	206neutrinos
repository name:	206neutrinos_$ACADEMICYEAR
repository rights:	ramassage-tek
language:	C, C++, perl 5, python 3 (≥ 3.5), ruby 2 (≥ 2.2), php 5.6, bash 4
group size:	1-2
compilation:	via Makefile, including re, clean and fclean rules

> **(!)**
> - Your repository must contain the totality of your source files, but no useless files (binary, temp files, obj files,...).
> - All the bonus files (including a potential specific Makefile) should be in a directory named *bonus*.
> - Error messages have to be written on the error output, and the program should then exit with the 84 error code (0 if there is no error).

Jørgen-Olaf, a distinguished nuclear physics researcher in Hørsholm, would love to travel back in time to discuss children's name choices with his own parents.

With his assistant, they are studying neutrinos, a kind of promising particle (ask `google`), and are trying to prove that these particles can travel faster than light.

Here is the protocol: given temperature and pressure conditions, they record the speeds of some particles under these conditions, modify one parameter, and start again.

Almost 11 months of working hard on several hundreds of millions records...

They are unable to efficiently store all of these values. For each series of records, they only register the following:

1. its arithmetical mean and standard deviation,
2. its root mean square (Jørgen-Olaf needs an average speed so that if all the particles travel at this speed, they would have the same total kinetic energy, which writes $1\ over2mv$),
3. its harmonic measure (as a precaution, in case Jørgen-Olaf would need another variable, with a non-quadratic dependency on speed).

Considering the size of the serials, Jørgen-Olaf needs you to develop software (in Danish, of course) that would allow him to update his data in real-time.

This program will take 4 numbers as inputs (the number of recorded values, their arithmetic mean, harmonic mean and standard deviation), and must:

1. wait for the next value to be written on the standard input,
2. print the number of recorded values, their standard deviation, arithmetic mean, root mean square and harmonic mean,
3. return to the first step, except if the keyword `ENDE` is entered.

> **💡** A smart program design will produce a compact and elegant code!

{ EPITECH. }
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L'EXPERTISE INFORMATIQUE

```
~/B-MAT-400> ./206neutrinos -h
USAGE
        ./206neutrinos n a h sd

DESCRIPTION
        n    number of values
        a    arithmetic mean
        h    harmonic mean
        sd   standard deviation
```

> ⚠ Your program output has to be strictly identical to the one below.

```
~/B-MAT-400> ./206neutrinos 12000 297514 297912 4363
indtast din vaerdi :  299042
    antal mãlinder :          12001
    standardafvilgelse :    4362.84
    aritmetisk gennemsnit :  297514.13
    kvadratisk gennemsnit :  297546.11
    harmonisk gennemsnit :   297912.09

indtast din vaerdi :  302420
    antal mãlinder :          12002
    standardafvilgelse :    4362.89
    aritmetisk gennemsnit :  297514.54
    kvadratisk gennemsnit :  297546.52
    harmonisk gennemsnit :   297912.46

indtast din vaerdi :  ENDE
```