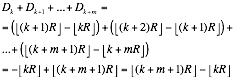
**Estimating real value from list of rounded numbers**

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A list of difference values is given  (m>0) where  and R is a positive real number. Find a lower and upper bound for R.

## Summing parts of the list

Write out the sum. Most elements in this sum cancel out:

 (1)

Find lower and upper bounds for these terms:

 (2)

and

 (3)

so

 (4)

or, using  (notice m was lowered by 1) for any k:

 (5)

In words, sum any m sequential elements from the list and you will always be just below or just above m\*R.

## Reversing the argument

Suppose R is unknown but  is given. We reverse the formula using that  is a natural number:

 (6)

and

 (7)

so

 (8)

## Example

Suppose the unknown R=8.7622. A random k is generated resulting in a difference list {8, 9, 9, 9, 9, 8, 9, 9, 9, 8, 9, 9, 9, 8, 9}.

The sum  and m=15, formula (8) gives

