Subject: Re: geometric mean?
Posted by noymer on Fri, 08 Sep 2000 01:25:47 GMT
View Forum Message <> Reply to Message

I have no response so I assume the answer is to
roll your own.

I did:

```
 FUNCTION GEOMEAN, arr
    RETURN, EXP(TOTAL(ALOG(arr))/N_ELEMENTS(arr))
 END
```

- Andrew

Sent via Deja.com http://www.deja.com/
Before you buy.

Subject: Re: geometric mean?
Posted by Martin Schultz on Fri, 08 Sep 2000 09:37:09 GMT
View Forum Message <> Reply to Message

Andrew wrote:
>
> I have no response so I assume the answer is to
> roll your own.
>
> I did:
>
> FUNCTION GEOMEAN, arr
>   RETURN, EXP(TOTAL(ALOG(arr))/N_ELEMENTS(arr))
> END
>
> - Andrew
>
> Sent via Deja.com http://www.deja.com/
> Before you buy.

Hi Andrew,

   I couldn't find such a routine either so I decided to hack it
together using the algorithm you suggest but including some error
cehcking and more caution with range limits or negative values. You
can find geomean.pro on my web pages:
 http://www.mpimet.mpg.de/~schultz.martin/idl/html/libmartin_ schultz.html

Cheers,
Martin

--

```
[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[ [[[[[[[
[[ Dr. Martin Schultz   Max-Planck-Institut fuer Meteorologie    [[
[[              Bundesstr. 55, 20146 Hamburg          [[
[[              phone: +49 40 41173-308              [[
[[              fax:   +49 40 41173-298             [[
[[ martin.schultz@dkrz.de                            [[
[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[ [[[[[[[
```

Subject: Re: geometric mean?
Posted by noymer on Fri, 08 Sep 2000 16:59:06 GMT
View Forum Message <> Reply to Message

In article <39B8B345.FDF4E45D@dkrz.de>,
  Martin Schultz <martin.schultz@dkrz.de> wrote:
> Hi Andrew,
>
>   I couldn't find such a routine either so I decided to hack it
> together using the algorithm you suggest but including some error
> cehcking and more caution with range limits or negative values. You
> can find geomean.pro on my web pages:
>
 http://www.mpimet.mpg.de/~schultz.martin/idl/html/libmartin_ schultz.html
>
> Cheers,
> Martin
>

Dear Martin,

   Thanks!!!

   You include checking for negative values, which would mess
up the ALOG function.

   Since I am taking geometric means of rates that are by
definition positive, I did not think of negative numbers.

   There is a problem, though...

   Someone please correct me if this is wrong; I'm not 100% sure.
The way I implemented the geometric mean was not the DEFINITION of
the geomean, but rather a computational SHORTCUT.

The DEFINITION goes something like:

GEOMEAN(Arr)=(PROD(Arr))^(1/n), where n is the number of elements, and PROD is the product operator. Logging both sides gets rid of the nasty "nth root" (i.e. ^(1/n)) and turns the product into a sum, which is also nice. Then exponentiating un-transforms the log.

Clearly we can't log any negative number, but we can product a bunch of numbers and then take an nth root of the result. And if there are zero or an even number of negative numbers there will be a real nth root, hence (I guess), the geomean would exist.

I don't know what the convention is with negative numbers, and it doesn't affect me because I am using positive numbers, but maybe someone out there knows:

  (1) Is geomean by convention undefined if any numbers in the set
       are negative?

  (2) Is geomean always the positive nth root? geomean of -2 and -2
       is +2?

Cheers,
    Andrew

Subject: Re: geometric mean?
Posted by Craig Markwardt on Sun, 17 Sep 2000 07:00:00 GMT
View Forum Message <> Reply to Message

Andrew <noymer@my-deja.com> writes:

> I have no response so I assume the answer is to
> roll your own.
>
> I did:
>
> FUNCTION GEOMEAN, arr
>   RETURN, EXP(TOTAL(ALOG(arr))/N_ELEMENTS(arr))
> END
>

> - Andrew

I am back from a long trip, so I'll bat a little cleanup here.

Andrew you asked about negative values of ARR. I think it's fair to say that the geometric mean is not meaningful (no pun intended) for negative values. Therefore I think it would be simplest to take the absolute value, like this:

```
FUNCTION GEOMEAN, arr
   RETURN, EXP(TOTAL(ALOG(ABS(arr)))/N_ELEMENTS(arr))
END
```

To go on to your more general question, the logarithm *is* in fact defined for negative values, unfortunately it's a complex number. Also, it's not unique. To prove that to yourself consider the fact that Y=EXP(I*X) is an oscillating function like COS and SIN, so a multitude of X values will give the same Y value (here I is the complex number COMPLEX(0,1)). If you really wanted to perform the geometric mean of negative numbers then be sure to cast them to the complex type before taking the logarithm. There will always be some ambiguity about the sign just as SQRT(X) can formally be either positive or negative.

Craig

--
 -- --------------
Craig B. Markwardt, Ph.D.   EMAIL: craigmnet@cow.physics.wisc.edu
Astrophysics, IDL, Finance, Derivatives | Remove "net" for better response
 -- --------------