Subject: Inaccuracies
Posted by Andy Loughe on Mon, 13 Nov 1995 08:00:00 GMT
View Forum Message <> Reply to Message

Ok, I am sure this has been discussed before, but let me start this thread again. I wish to create a 15-element vector which contains the numbers -1.4 to 1.4 by an increment of 0.2 I also wish the sum of these elements to be zero (No, this isn't the new math). Here is what I tried...

TRIAL #1

======

IDL> a = findgen(15)*.2 - 1.4 IDL> print, total(a) 7.15256e-07

Hmmm! Not so good.

TRIAL #2

=======

IDL> a = dindgen(15)*(.2D)-1.4D IDL> print, total(a, /double) 4.4408921e-15

Ok, this is better but not correct. And what are the values of a?

IDL> print, a

-1.4000000 -1.2000000 -1.0000000 -0.80000000 -0.60000000 -0.40000000 -0.20000000 2.2204460e-16 0.2000000 0.4000000 0.60000000 0.80000000 1.0000000 1.2000000 1.4000000

I seem to have lost a zero somewhere, and for me this matters!!!

TRIAL #3

=======

What if I only needed 13 numbers between -1.2 and 1.2. IDL> a = findgen(13)*.2 - 1.2 IDL> print, total(a) 0.00000

Now how can I get this to work for 15 numbers?

Maybe I am missing something here, but this kind of behavior makes IDL a bit problematical for scientific use. With only 15 numbers and double precision arithmetic, I can't believe this would fail in FORTRAN or C!

--

Andrew F. Loughe (afl@cdc.noaa.gov)
University of Colorado, CIRES * Campus Box 449 * Boulder, CO 80309

phone: (303) 492-0707 fax: (303) 497-7013

Subject: Re: Inaccuracies

Posted by bowman on Mon, 13 Nov 1995 08:00:00 GMT

View Forum Message <> Reply to Message

In article <30A7BC4D.7018@cdc.noaa.gov>, Andy Loughe <afl@cdc.noaa.gov> wrote:

- > IDL> a = findgen(15)*.2 1.4
- > IDL> print, total(a)
- > 7.15256e-07
- ~7 significant figures is what you expect from single precision arithmetic.
- > IDL> a = dindgen(15)*(.2D)-1.4D
- > IDL> print, total(a, /double)
- > 4.4408921e-15
- ~15 is what you expect from double precision.

You can do this:

IDL > i = LINDGEN(15)*2L - 14L

IDL> print, i

IDL> c = DOUBLE(i)/DOUBLE(10)

IDL> print, c

which gives you an exact 0 (division of 0 by anything should(!) be exactly 0), but the other terms are not necessarily exact, and you still get

IDL> print, total(c) 2.2204460e-16

which is the best you can hope for.

That's floating point arithemtic ...

Regards, Ken Bowman

--

Kenneth P. Bowman, Assoc. Prof. Department of Meteorology Texas A&M University College Station, TX 77843-3150

409-862-4060 409-862-4132 fax bowman@csrp.tamu.edu