Subject: CHECK_MATH and exp()
Posted by jeyadev on Mon, 26 Aug 2002 23:15:46 GMT
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Could someone please explain this:

```
WAVE> junk = check_math(1,0)
WAVE> print, junk
      0
WAVE> y = exp(-9.2^2)
WAVE> print, y, check_math(1,0)
  1.74307e-37           0
WAVE> y = exp(-9.3^2)
WAVE> print, y, check_math(1,0)
  2.74074e-38           0
WAVE> y = exp(-9.4^2)
% Program caused arithmetic error: Floating underflow
% Program caused arithmetic error: Floating illegal operand
WAVE> print, y, check_math(1,0)
  4.22418e-39           0
```

I first ran into the problem in a set of loops, and narrowed down the

```
% Program caused arithmetic error: Floating illegal operand
```

error to a call to the exp() function. A little fooling around resulted in getting to the above. It appears that when the argument reaches -9.4^2, the underflow occurs, but I cannot understand the "illegal operand". Also, why does CHECK_MATH() not catch the underflow.

And, now for more:

```
WAVE> .run
- for i=90,100 do begin
-   x = i/10.0
-   y = exp(-x^2)
-   print, x, y, check_math(1,0)
- endfor
- end
% Compiled module: $MAIN$.
      9.00000  6.63968e-36        128
      9.10000  1.08661e-36        128
      9.20000  1.74307e-37        128
      9.30000  2.74074e-38        128
% Program caused arithmetic error: Floating underflow
```

```
% Program caused arithmetic error: Floating illegal operand
      9.40000  4.22418e-39         160
% Program caused arithmetic error: Floating underflow
% Program caused arithmetic error: Floating illegal operand
      9.50000  6.38150e-40         160
% Program caused arithmetic error: Floating underflow
% Program caused arithmetic error: Floating illegal operand
      9.60000  9.44966e-41         160
% Program caused arithmetic error: Floating underflow
% Program caused arithmetic error: Floating illegal operand
      9.70000  1.37159e-41         160
% Program caused arithmetic error: Floating underflow
% Program caused arithmetic error: Floating illegal operand
      9.80000  1.95201e-42         160
% Program caused arithmetic error: Floating underflow
% Program caused arithmetic error: Floating illegal operand
      9.90000  2.71852e-43         160
% Program caused arithmetic error: Floating underflow
% Program caused arithmetic error: Floating illegal operand
      10.0000  3.78351e-44         160
```

Again, I can see the problem for x > 9.3. But, what is the CHECK_MATH() doing? First, it seems to say that there is an "floating point operand error", and then it is that *plus* and underflow. What is the "floating point operand error" that the code 128 is indicating?

I am running PV-WAVE CL Version 6.01 (sun4 solaris sparc) on a Sun Ultra 10 under Solaris 8.

thanks

--

Surendar Jeyadev jeyadev@wrc.xerox.bounceback.com

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Subject: Re: CHECK_MATH and exp()
Posted by James Kuyper on Wed, 28 Aug 2002 14:22:06 GMT
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Surendar Jeyadev wrote:

>
> Could someone please explain this:
...
>   WAVE> y = exp(-9.4^2)
>   % Program caused arithmetic error: Floating underflow
>   % Program caused arithmetic error: Floating illegal operand

 I only get the first message, not the second.

> ... Also, why does CHECK_MATH() not catch the
> underflow.

Because, as the documentation says:

"No errors detected since the last interactive prompt or call to
CHECK_MATH".

Since the exp() call occurred before the last interactive prompt, it
doesn't count. Instead, try the following:

IDL> y = exp(-9.4^2) & print,check_math(-1)
% Program caused arithmetic error: Floating underflow
          32

check_math() wasn't really intended for use at the command line; you get
immediate notification of errors when working interactively, so it isn't
needed.

> And, now for more:
>
>   WAVE> .run
>   - for i=90,100 do begin
>   -   x = i/10.0
>   -   y = exp(-x^2)
>   -   print, x, y, check_math(1,0)
>   - endfor
>   - end
>   % Compiled module: $MAIN$.
>   9.00000 6.63968e-36   128
>   9.10000 1.08661e-36   128
>   9.20000 1.74307e-37   128
>   9.30000 2.74074e-38   128
>   % Program caused arithmetic error: Floating underflow
>   % Program caused arithmetic error: Floating illegal operand
>   9.40000 4.22418e-39   160
...

I get:

```
% Compiled module: $MAIN$.
      9.00000  6.63968e-36          0
      9.10000  1.08661e-36          0
      9.20000  1.74307e-37          0
      9.30000  2.74074e-38          0
% Program caused arithmetic error: Floating underflow
      9.40000      0.00000         32
```

> I am running PV-WAVE CL Version 6.01 (sun4 solaris sparc)
> on a Sun Ultra 10 under Solaris 8.

I am running idl 5.4 on an SGI machine running IRIX,

Subject: Re: CHECK_MATH and exp()
Posted by jeyadev on Fri, 30 Aug 2002 19:36:21 GMT
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In article <3D6CDC8E.DB526253@saicmodis.com>,
James Kuyper <kuyper@saicmodis.com> wrote:

Thanks for your reply .....

> Surendar Jeyadev wrote:
>>
>> Could someone please explain this:
> ...
>>   WAVE> y = exp(-9.4^2)
>>   % Program caused arithmetic error: Floating underflow
>>   % Program caused arithmetic error: Floating illegal operand
>
> I only get the first message, not the second.

The begining of the differences .....!

> Since the exp() call occurred before the last interactive prompt, it
> doesn't count. Instead, try the following:
>
> IDL> y = exp(-9.4^2) & print,check_math(-1)
> % Program caused arithmetic error: Floating underflow
>   32

And I get

WAVE> y = exp(-9.4^2) & print,check_math(-1)
% Program caused arithmetic error: Floating underflow

% Program caused arithmetic error: Floating illegal operand
        160

>> I am running PV-WAVE CL Version 6.01 (sun4 solaris sparc)
>> on a Sun Ultra 10 under Solaris 8.

Obviously, it is something to do with ....

> I am running idl 5.4 on an SGI machine running IRIX,

.... PV-Wave. Not sure if it is to do with the Sun version,
though.

thanks, anyway,

--

Surendar Jeyadev jeyadev@wrc.xerox.bounceback.com

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