

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

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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 beginning of the differences

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