

---

Subject: Re: complex math error?

Posted by [heard](#) on Fri, 19 May 1995 07:00:00 GMT

[View Forum Message](#) <> [Reply to Message](#)

---

In Article <3pgkmo\$b3s@post.gsfc.nasa.gov>, thompson@orpheus.nascom.nasa.gov (William Thompson) wrote:

> heard@drep.dnd.ca (Garry J. Heard) writes:

>

>> Hi,

>

>> I think we've found an erratic math error in IDL V3.6 (running on a PPC and  
>> an SGI results were similar). Here it is:

>

>

>> print, exp( complex(0,1)\*sqrt(2.)\*10. )^sqrt(2.)

>

>> Execute the above line a time or two and you'll get the wrong answer, then try  
>> almost any simple math operation on a complex number. i.e.,

>

>> print, complex(0,1)^2

>

>> Chances are you'll get a wrong answer again. Try the last operation again  
>> and you might then get the correct answer. It's an erratic sort of bug and  
>> seems to have a lot to do with complex numbers and sqrt functions. But it  
>> is unpredictable. The only way we have been able to induce it so far is to  
>> raise a complex exponential to a power involving a sqrt. I guess you should  
>> be wary of any complex math in IDL until RSI has had a look at it. Also, the  
>> bug may not exist in V4. I think that WAVE may not allow these kinds of  
>> operations on complex values, so in a way that will protect you from this  
>> bug (I might be wrong about this since I don't have a current WAVE version  
>> to try it on).

>

> I can't make it fail running IDL 3.6.1c under OSF/1 v2.0 on an AXP 3000/600  
> workstation. I always get the result

>

> IDL> print, exp( complex(0,1)\*sqrt(2.)\*10. )^sqrt(2.)  
> (-1.28269e-10, 1.66070e-10)

>

> no matter how many times I try it. (I assume that's the correct value.) Also,  
> I always get

>

> IDL> print, complex(0,1)^2  
> (-1.00000, 0.00000)

>

> Bill Thompson

Hi Bill,

Sorry. That answer is wrong.  $\exp[i z]$  will always have a magnitude of 1. This turns out to be an impossible problem anyway since there are several roots to the solution, but each of them must have a unit modulus. It's odd that you always get the other problem to work properly after getting the previous one wrong, but I did say that it was unpredictable. I've done it quite a few times and never gotten exactly the same results.

In any case, I must tell you that RSI responded very quickly to my e-mail to their support department. They were aware of the bug and have fixed it in V4.0 that is now being shipped.

Also, I had some friends try it on PV-WAVE and they can't do it at all. WAVE only appears to have marginal complex number support. WAVE users should try squaring a complex number, I think they will get an illegal operation error.

-----  
Garry J. Heard      EDRD  
                     heard@edrd.dnd.ca  
                     604/363-2905

Any opinions expressed are my own and not necessarily those of my employer.

---