Subject: Re: Old Question
Posted by thompson on Wed, 15 Dec 1999 08:00:00 GMT
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Ben Tupper <pemaquidriver@tidewater.net> writes:

> Jacques Basson wrote:

>> Hi all
>>
>> Sorry, this has got to be an old question, but I can't seem to locate
>> the answer. What is the way around the following problem?
>>
>> IDL> a = -1
>> IDL> print, -1^(1./3)
>> -1.00000
>> IDL> print, a^(1./3)
>> NaN
>> % Program caused arithmetic error: Floating illegal operand
>>
>> Thanks
>> Jacques

Um, I don't know if you realize this, but the only reason that the first example DOESN'T fail is because

```
 IDL> print, -1^(1./3)
```

is equivalent to

```
 IDL> print, -( 1^(1./3))
```

In other words, the minus sign doesn't come into play until after the exponentiation is applied. If you typed in

```
 IDL> print, (-1)^(1./3)
```

you'd get the NaN result, with the error message, as above. Note that you can test this by typing in

```
 IDL> print, -1^2, -(1^2), (-1)^2
      -1      -1       1
```

Of course, as is implied by the answer below, the proper way to evaluate your example would be

IDL> a = -1
IDL> print, a^complex(1./3, 0)
(0.500000,   0.866025)

William Thompson

> Hello,

> I now know why it happens. In the documentation I see...

> Exponentiation

> The caret (^) is the exponentiation operator. A^B is equal to A raised to
> the B power.

> * If A is a real number and B is of integer type, repeated multiplication
> is applied.
> * If A is real and B is real (non-integer), the formula A^B = e^(B ln A)
> is evaluated.
> * If A is complex and B is real, the formula A^B = (re^(iq))^B = r^B *
> (cosBq + isinBq) (where r is the real part of A and iq is the imaginary
> part) is evaluated.

> * B is complex, the formula A^B = e^(B ln A) is evaluated. If A is
> also complex, the natural logarithm is computed to be ln(A) = ln(re^(iq))
> = ln(r) + iq (where r is the real part of A and iq is the imaginary
> part).
> * A^0 is defined as 1.

> Your example falls into the second type of operation.   I don't know how
> to get around that but would like to know also.

> Ben

> --
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