
Subject: Re: fractional powers of negative numbers?
Posted by [thompson](#) on Mon, 28 Apr 1997 07:00:00 GMT
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Jack Saba <jsaba@magus.stx.com> writes:

> IDL is computing $-(5.^{1.51})$ in your example. If you try $(-5.)^{1.51}$, you
> will get an error.

> Med Bennett wrote:

```
>>
>> Can someone explain this to me? Is it possible to compute the fractional
>> power of a negative number? IDL does it on single negative values but
>> not on arrays containing negative values.
>>
>> IDL> print,findgen(11)-5
>>   -5.00000  -4.00000  -3.00000  -2.00000
>>   -1.00000   0.00000   1.00000   2.00000
>>    3.00000   4.00000   5.00000
>> IDL> print,(findgen(11)-5)^1.51
>>   -1.#IND0  -1.#IND0  -1.#IND0  -1.#IND0
>>   -1.#IND0   0.00000   1.00000   2.84810
>>    5.25355   8.11168  11.3617
>> % Program caused arithmetic error: Floating illegal operand
>> IDL> print,-2.^1.51
>>   -2.84810
>> IDL> print,-5.^1.51
>>  -11.3617
```

The only way to compute the fractional power of a negative number is to use complex arithmetic, e.g.

```
IDL> print,complex(findgen(11)-5,fltarr(11))
(  -5.00000,   0.00000)(  -4.00000,   0.00000)
(  -3.00000,   0.00000)(  -2.00000,   0.00000)
(  -1.00000,   0.00000)(   0.00000,   0.00000)
(   1.00000,   0.00000)(   2.00000,   0.00000)
(   3.00000,   0.00000)(   4.00000,   0.00000)
(   5.00000,   0.00000)
IDL> print,(complex(findgen(11)-5,fltarr(11)))^1.51
% Program caused arithmetic error: Floating overflow
% Detected at $MAIN$
% Program caused arithmetic error: Floating illegal operand
% Detected at $MAIN$
% Program caused arithmetic error: Floating illegal operand
% Detected at $MAIN$
```

```
( 0.356881, -11.3561)( 0.254794, -8.10767)
( 0.165018, -5.25096)( 0.0894611, -2.84669)
( 0.0314108, -0.999507)( NaNQ, NaNQ)
( 1.00000, 0.00000)( 2.84810, 0.00000)
( 5.25355, 0.00000)( 8.11168, 0.00000)
( 11.3617, 0.00000)
```

Interestingly enough, here it complains about taking (0,0) to a fractional power. I would have said that (0,0) to any power was still (0,0).

Bill Thompson
