

Re: Bug in Mathematica 6 – Integrate – 30 – (power, invalid value)

Source: <http://sci.tech-archive.net/Archive/sci.math.symbolic/2007-07/msg00036.html>

- *From:* dimitris <dimmechan@xxxxxxxxx>
 - *Date:* Fri, 06 Jul 2007 13:06:23 -0700
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Daniel Lichtblau :

On Jul 6, 2:39 pm, dimitris <dimmec...@xxxxxxxxx> wrote:

[...]
The settings

Integrate[...,Assumptions]

and

Assuming[Integrate[...]]

are equivalent or not?

Not. I believe (perhaps naively) that ideally they would be, but in practice there seem to be differences in the actual handling. This is a phenomenon still under investigation.

I am a little confused.

If the answer is no can you show me a simple example?
Which of them is more preferable?

Integrate[...,Assumptions->...] is a bit easier to control in that there is no issue of "global" assumptions interfering in any way.

I do not have a particularly simple example offhand, but I'll show the full example of this thread, as done in my development kernel.

```
In[1]:= InputForm[Integrate[((1 + z^2)/(1 + z^4))^n, {z, 0, Infinity},  
Assumptions -> {n > 0, Element[n, Integers]}] ]
```

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```
Out[1]//InputForm=
If[2*n > 1, (4^(-1 - n)*(4^(1 + n)*Gamma[5/4]*Gamma[1 - n]*Gamma[-1/4
+ n])*
HypergeometricPFQ[{1/4, 1/2 - n/2, -n/2}, {1/2, 5/4 - n}, -1] +
4^n*n*Gamma[3/4]*Gamma[1 - n]*Gamma[-3/4 + n]*
HypergeometricPFQ[{3/4, 1/2 - n/2, 1 - n/2}, {3/2, 7/4 - n}, -1]
-
8*n*Sqrt[Pi]*Gamma[1/2 - 2*n]*Gamma[-1 + 2*n]*
HypergeometricPFQ[{-1/4 + n/2, 1/4 + n/2, n}, {1/4 + n, 3/4 + n},
-1])*
Sin[n*Pi])/Pi, Integrate[(((1 + z^2)/(1 + z^4))^n, {z, 0, Infinity}),
Assumptions -> Inequality[0, Less, n, LessEqual, 1/2]]]
```

```
In[2]:= InputForm[Assuming[n > 0 && Element[n, Integers],
Integrate[((1 + z^2)/(1 + z^4))^n, {z, 0, Infinity}]] ]
```

```
Out[2]//InputForm=
If[2*n > 1, (4*Gamma[5/4]*Gamma[-1/4 + n]*HypergeometricPFQ[
{1/4, 1/2 - n/2, -n/2}, {1/2, 5/4 - n}, -1] +
n*Gamma[3/4]*Gamma[-3/4 + n]*HypergeometricPFQ[{3/4, 1/2 - n/2, 1 -
n/2},
{3/2, 7/4 - n}, -1] + (2^(3 - 2*n)*Sqrt[Pi]*Gamma[1/2 - 2*n]*
Gamma[-1 + 2*n]*HypergeometricPFQ[{-1/4 + n/2, 1/4 + n/2, n},
{1/4 + n, 3/4 + n}, -1])/Gamma[-n])/(4*Gamma[n]),
Integrate[(((1 + z^2)/(1 + z^4))^n, {z, 0, Infinity}),
Assumptions -> Inequality[0, Less, n, LessEqual, 1/2]]]
```

The results look similar but are in fact a bit different, as pointed out earlier by David Cantrell.

Thank you in advance for your response
(and in general thank you a lot for your interest
you show participating to this forum, MathGroup
e.t.c. talking about CASs, Mma, symbolic algebra
issues and so many other interesting things without
any sense of elitism of you or Mathematica).

Cheers
Dimitris

Daniel Lichtblau
Wolfram Research

Until now (and working with versions 4 and 5.2) I don't remember to have encountered a case where the two settings gave different outputs.

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[There was a thread in MathGroup a long time ago talking about these two settings but I can't find it unfortunately. What I remember is that the conclusion was that Assuming[...] setting was more preferable. But I don't remember if the issue of "global" assumptions was discussed.]

Interesting thread that began from Vladimir's machine!

Thanks a lot again for your quick response.

Dimitris

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