

big exponents in rational functions [Re: Yet another Maple regression bug, 2000--2007--? (trivial integral)]

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On Jun 15, 9:33 am, Vladimir Bondarenko <[v...@xxxxxxxxxxxxxxxxxxxxx](mailto:v...@xxxxxxxxxxxxxxxxxxxxx)> wrote:

```
.....
BUG # XXXXXX int (1-D): Error, (in X) numeric exception
[...]
PRESENT Maple 11.00,IBM INTEL NT, Feb 16 2007 Build ID 277223
[...]

TEST CASE: int(1/z^(10^10), z= 1..infinity);

ACTUAL: Error, (in match/heuristic) numeric exception:
overflow

EXPECTED: 1/9999999999

.1000000000e-9

[...]
PRESENT+ =

Error, (in limit/easy) integer too large in context
[...]
```

While this example is simple for, say, a calc student, from the symbolic computation view this is merely a manifestation of reasonable handling of pathology, in particular, the case of huge exponents.

For some variants, one might look at (in Mathematica terminology)

```
Integrate[1/(z^10^3 - 1), {z, 1, Infinity}]
```

```
Together[1/z^(10^10) + 1/z]
```

Mathematica handles the first but only by fortunate choice of

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preprocessing heuristics (an earlier version I tried seemed to choke, even when the second exponent was 2 rather than 3). Mathematica gives up on the Together example, with a message about an exponent being too large (which is similar to the message Maple emits when giving up on the integral from the original post).

For an interesting variant of the original integral:

```
In[7]:= InputForm[Integrate[1/z^(10^9), {z,1,Infinity}]]
Out[7]//InputForm= 1/999999999
```

```
In[8]:= InputForm[Integrate[1/z^(10^10), {z,1,Infinity}]]
Out[8]//InputForm= Gamma[999999999]/Gamma[1000000000]
```

This was with version 4.0 of Mathematica. The results are both correct, but indicate a change in handling occurred once the exponent went beyond 32 bit machine number size. Not a dreadful thing to do, just seemingly a bit weird.

I see nothing to indicate bad handling of any of these, including  $\int(1/z^{10^{10}}, z= 1..infinity)$ . The pathology is in the examples rather than the programs.

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