Re: " Wanted the r iterated of f(x) = 2*x/(1−x^2) , f^[r](x) "

Source: http://sci.tech−archive.net/Archive/sci.math/2005−10/msg00655.html

---

- *From*: rusin@xxxxxxxxxxxxxxxxxxxxxx (Dave Rusin)
- *Date*: 7 Oct 2005 14:26:40 GMT

In article <1128665817.093842.197060@xxxxxxxxxxxxxxxxxxxxxxxxxxxx>,
<alainverghote@xxxxxxxx> wrote:

>Do some of you know a closed form
>for the rth iterate of 2*x/(1−x^2).

.... which equals tan(2 u) if x = tan(u). That is, if f(x)=2x/(1−x^2)
then f(tan(u)) = tan(2u), so that f(f(tan(u))) = tan(4u) and
f(f(f(tan(u)))) = tan(8u), etc. In general you can then prove by
induction that f^r (tan(u)) = tan(2^r u) for positive integers r.

You can write this as f^r(x) = tan(2^r arctan(x)) I suppose but
this is only because, for a given x, the possible values of u all
differ by integer multiples of pi and thus the possible values
of 2^r arctan(x) will also differ by integer multiples of pi, giving
them all the same values in tan() . I say this just to emphasize,
as always must be done, that this analysis is predicated on the
assumption that r is an integer; there is nothing in the defnition
of f alone that tells us what f^r even _means_ when r is
not an integer.

dave

.

- ***Follow−Ups***:
  - ***Re: " Wanted the r iterated of f(x) = 2*x/(1−x^2) , f^[r](x) "***
    - *From:* alainverghote
- ***References***:
  - ***" Wanted the r iterated of f(x) = 2*x/(1−x^2) , f^[r](x) "***

◊ *From:* alainverghote

- Prev by Date: ***Re: infinity***
- Next by Date: ***Re: infinity***
- Previous by thread: ***" Wanted the r iterated of f(x) = 2*x/(1−x^2) , f^[r](x) "***
- Next by thread: ***Re: " Wanted the r iterated of f(x) = 2*x/(1−x^2) , f^[r](x) "***
- Index(es):
    - ***Date***
    - ***Thread***