# Re: Rational and irrational numbers

***Source:*** http://sci.tech−archive.net/Archive/sci.math/2005−08/msg05775.html

---

- *From*: quasi <quasi@xxxxxxxx>
- *Date*: Mon, 29 Aug 2005 19:10:34 −0700

---

On Mon, 29 Aug 2005 18:46:13 −0700, quasi <quasi@xxxxxxxx> wrote:

>On 29 Aug 2005 15:06:16 −0700, deepkdeb@xxxxxxxxx wrote:
>
>>Attention: quasi
>>
>>If you have time and interest kindly consider the following situation:
>>
>>u = Asqrt(g) + Bsqrt(h) (1) and then u^7 = Csqrt(g) + Dsqrt(h)
>>(2)
>>
>>then [Csqrt(g) + Dsqrt(h)]^1/7 = Asqrt(g) + Bsqrt(h)
>>
>>Therefore, one can obtain (2) from (1) and (1) from (2).
>>There is one additional element v which is a conjugate of u.
>>
>>After reviewinf my proof I believe the proof of the assertion is simple
>>and self evident.
>>But I could be wrong.
>
>Yes, (1) => (2), but the reverse direction is not automatic.
>
>What you are saying is that for fixed g,h, then each pair (A,B)
>induces a pair (C,D), in other words (1) => (2). Fine, I accept that.
>And of course you can go back if you take a pair (C,D) that came from
>a pair (A,B). But how do you know that from an arbitrary pair (C,D)
>you can go back. Not everything of that form is a 7th power of the
>same form, unless it is, in which case, all you are saying is that if
>(C,D) corresponds to a 7th power of some (A,B), then the (real) 7th
>root has the same form, but of course it does since you created the
>pair (C,D) from a pair (A,B).
>
>Bottom line −− I think you should settle for (1) => (2). The fact that
>the mixed radicals drop out is interesting, and can be explained by
>applying the binomial theorem −− I assume that's what you did, right?
>
>But a point should be raised here. Why did you specify odd k, k>5? You
>do need k to be odd so as to avoid mixed radicals, but any odd
>positive integer is just fine for k, even the trivial case, k=1.

>
>quasi

To explain a little more ...

My counterexample from yesterday shows that you can't just pick any pair (C,D) and find an (A,B) that generates it.

Let g=3, h=2, C=1, D=1.

Then:

C*sqrt(g)+D*sqrt(h)=sqrt(3)+sqrt(2)

C*sqrt(g)+D*sqrt(h)=sqrt(3)−sqrt(2)

Your assignment, if you choose to accept it (but I advise against trying), is to find A,B such that:

(A*sqrt(g)+Bsqrt(h))^7=C*sqrt(g)+D*sqrt(h)

(A*sqrt(g)−Bsqrt(h))^7=C*sqrt(g)−D*sqrt(h)

You see, if you get to pick (A,B) then (C,D) are determined from the binomial expansion, but that's the implication (1)=>(2).

For the reverse implication, I get to pick (C,D) and your claim is that no matter what pair (C,D) I pick, you can always find an (A,B) that generates it. Ok, good luck with my example, but to save yourself a lot of work with no chance of success, you should give up quickly on this one.

quasi
.

---

- ***Follow−Ups***:
    - ***Re: Rational and irrational numbers***
        - *From:* deepkdeb
- ***References***:
    - ***Rational and irrational numbers***
        - *From:* deepkdeb
    - ***Re: Rational and irrational numbers***
        - *From:* deepkdeb
    - ***Re: Rational and irrational numbers***
        - *From:* Keith A. Lewis
    - ***Re: Rational and irrational numbers***
        - *From:* quasi
    - ***Re: Rational and irrational numbers***

- ◊ *From:* deepkdeb
- ♦ ***Re: Rational and irrational numbers***
  - ◊ *From:* quasi

- Prev by Date: ***Re: Han's startling new set theory.***
- Next by Date: ***Re: Cardinality of Real Numbers***
- Previous by thread: ***Re: Rational and irrational numbers***
- Next by thread: ***Re: Rational and irrational numbers***
- Index(es):
  - ♦ ***Date***
  - ♦ ***Thread***