Re: square through 4 points (was Re Soddy)

Source: http://sci.tech−archive.net/Archive/sci.math/2004−10/7829.html

---

From: philippe 92 (*antispam_at_free.invalid*)
Date: 10/27/04

```
Date: Wed, 27 Oct 2004 13:09:23 +0200
```

Hello,

Dave Rusin wrote:
>
>>*Rainer Rosenthal wrote:*
>
>>>*These days we discussed a funny question: Think of a square*
>>>*in the sand. Put stones 1, 2, 3 and 4 on each of the sides*
>>>*of the square. Wait two days. You see the stones but the*
>>>*square has vanished in the wind. How to reconstruct it?*
>
> *The geometric constructions presented here seem to be fine.*
> *I thought I'd look at this one algebraically. I noticed along the*
> *way that there was a simple geometric construction and now that I*
> *actually look at the methods already posted, I think the algebra*
> *has led to the same techniques given geometrically. But algebra*
> *is nice too, so here we go!*
>

It's your opinion.

<snip tedious calculations>

>
> *For example, suppose we will have to construct the square when three of*
> *the points are at (0,1), (0,0), and (2,0). If these are to be points*
> *#2, #3, #4 in that order, then Q1 = (−1,−2) and we can search for*

Hey ! your above calculations suppose you have P1 P2 P3 P4 *clockwise*
It's impossible to choose P1 with these P2 P3 P4 to form a convex
quadrilateral, don't matter if P_i lie on a square or not.

The only way to get a convex quadrilateral with these P2 P3 P4 is
to number them *anti−clockwise*, that is P1 is restricted to
x > 0, y > 0, x/2 + y/1 > 1 for P1 P2 P3 P4 to be convex.

Then you have to rotate anticlockwise to get Q1 = (+1, +2)

> solvable locations for (x1,y1) by drawing various lines and circles
...
> ... so no choice of point#1 will lead to a square.

Choosing the other Q1 leads to many solutions for P1...
(as in your second example).

Still thinking the geometrical point of view is easier, unless
using an efficient symbolic calculation software.

I think Rainer has begun to study the P1 locations, given P2 P3 P4,
geometrically (seen a post about that on de.sci.mathematik).

Regards.

--
philippe
(chephip at free dot fr)