Re: Ten points in a square

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- *From*: quasi <quasi@xxxxxxxx>
- *Date*: Fri, 11 Apr 2008 18:34:10 −0500

On 11 Apr 2008 21:54:31 GMT, David W. Cantrell
<DWCantrell@xxxxxxxxxxx> wrote:

> "Zdislav V. Kovarik" <kovarik@xxxxxxxxxxx> wrote:
>
> > It is a standard exercise on Pigeonhole Principle to prove:
> >
> > If you place 10 distinct points in a square of side 1, then at least
> > two points will have distance no more than sqrt(2)/3 (about 0.4714).
> >
> > My question: This number is an upper bound for the minimum
> > positive distance. Has anyone found the least upper bound?
> >
> > (It is at least 1/3, just place the points at lattice points
> > with stepsize 1/3. With slightly more effort, one can replace
> > 1/3 by sqrt(2)/(2*sqrt(2)+1), about 0.3694.)
> >
> > By the way, tens of millions of pseudorandom experiments have
> > not exceeded 0.32.
>
> It is 0.421..., which follows from the packing of ten unit circles, proven
> optimal, shown at <http://www.stetson.edu/~efriedma/cirinsqu/>.

It's not clear to me that the 10 circle packing configuration answers
the OP's question.

There's no requirement for the placed points to be any given distance
away from the boundary of the square.

Letting x be the answer to the OP's question, then, as far as I can
see, the 10 circle packing configuration gives a _lower_ bound on x.

In other words, what we now know is

0.421... <= x <= sqrt(2)/3

Unless I'm missing something.

quasi
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