

Ideas about patterns from PITB Day 2

- If you divide n by 4 and look at the remainder

if remainder = 1

= 2

= 3

= 4

?

then n can't be written as $x^2 + y^2$

These
are conjectures

- If you divide n by 12 & get a remainder of 1, it seems to work
- Factoring the numbers that work...

$$y_1 = \begin{matrix} x^2 + 1 \\ x^2 + 4 \\ x^2 + 9 \\ x^2 + 16 \end{matrix}$$

2nd Table

$$\begin{matrix} 1^2 + 1^2 \\ 1^2 + 2^2 \\ \vdots \end{matrix} \xrightarrow{3 \text{ more}} \begin{matrix} 2^2 + 2^2 \\ 2^2 + 3^2 \end{matrix} \xrightarrow{5 \text{ more}} 3^2 + 3^2$$

$$y_1 = \sqrt{\# - x^2}$$

make a
table and look
for integers

Bowen's Question:

How many different distances can you make on a $n \times n$ board?

Size of board

diff lengths
on sq board

diff lengths
on 150 board

1x1

•

1

0 counts as
a distance
for us

1 ?

2x2



3

3 ?

3x3

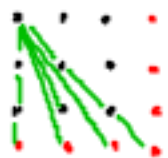


6

1, 2, $2\sqrt{2}$
 $\sqrt{5}$, $\sqrt{2}$, 0

6 ?

4x4



10

10 ?

5x5

15

but 6x6 is
20, not 21

15 ?