UH Math Circle

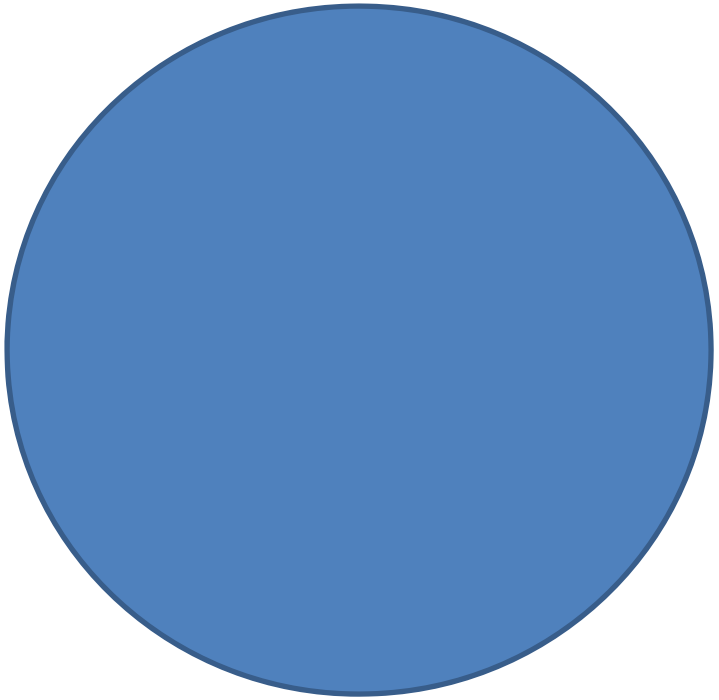
October 1, 2011

Today

- Introductions
- Food for Thought
- What does this do?
- Project problem.

Food for Thought - I

Can you divide a circular disk into two or more congruent pieces so that at least one of the pieces does not touch the center of the circle?



Food for Thought - II

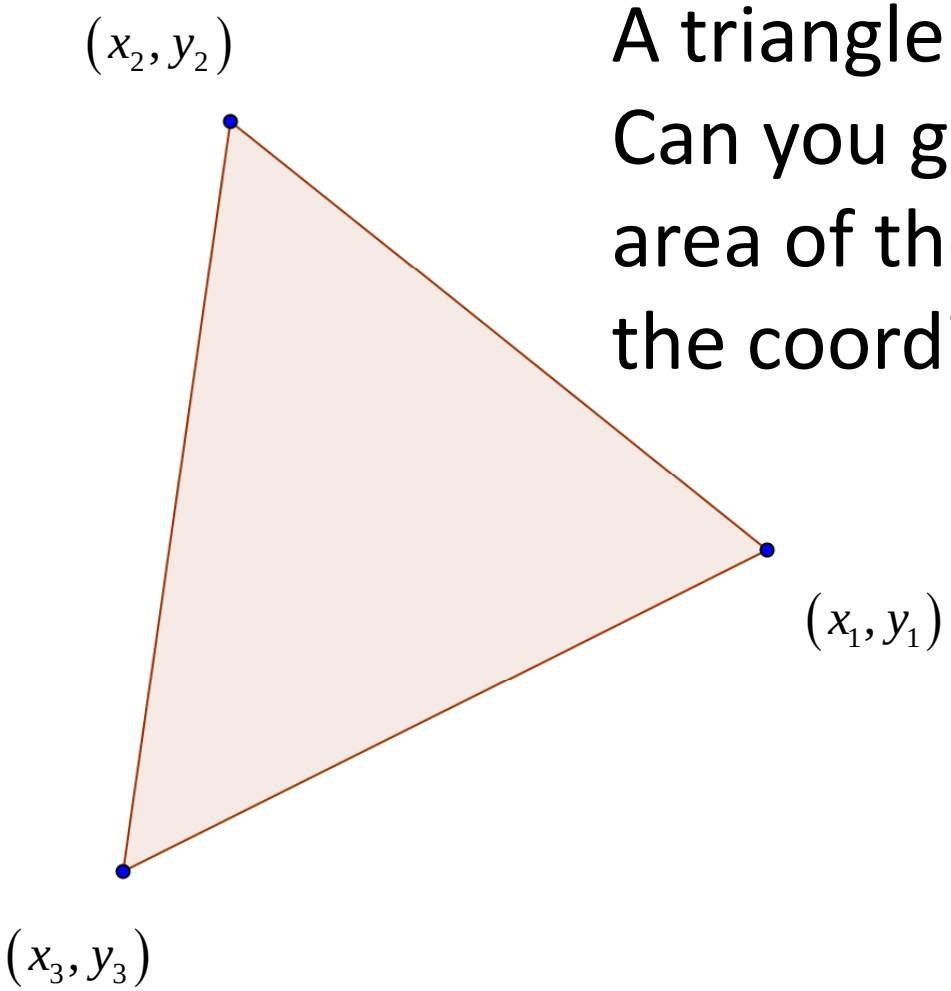
Pick a value in the first row. Then move forward that number from left to right and top to bottom. Keep going until you cannot complete a process.

4	1	5	3	3	5	2	4
3	2	2	5	1	5	2	5
2	4	2	1	3	4	2	3
3	5	4	3	2	3	3	3
1	1	1	3	5	5	5	5
1	2	1	5	5	5	3	3

In this case, you will always land on the 4^{th} entry in the last row. Something similar will happen nearly EVERY time a list of numbers is generated in a random manner.

Question: Can you create a grid where the last value can be different depending upon where you start?

Food for Thought - III



A triangle is shown on the left. Can you give a formula for the area of the triangle in terms of the coordinates of the vertices?

What Does This Do?

Suppose a and b are natural numbers with $a > b$. Follow the pseudo code below to find the output.

Let m be the largest positive integer so that $a \geq mb$, and let r be the nonnegative integer so that $a = mb + r$.

Do While $r > 0$

$a = b$

$b = r$

Let m be the largest positive integer so that $a \geq mb$, and let r be the nonnegative integer so that $a = mb + r$.

Loop

Display b

Project Problem

Suppose 2 distinct lines are drawn on a sheet of paper. How many regions can be formed?

Repeat with 3 lines.

Repeat with 4 lines.

Can you generalize your answer?

Repeat the project with “lines” replaced by “circles”.