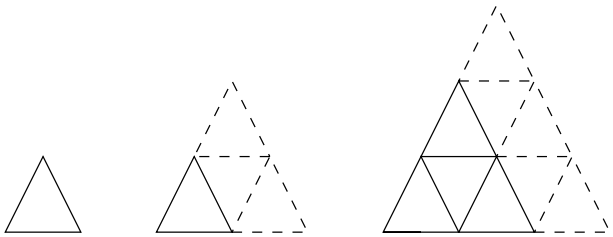
Math 219: Homework 5
Due: Wednesday, April 2nd

1) With toothpicks you can make a triangular grid as follows:



Give a formula for how many toothpicks it take to make an n-fold triangular grid. You must find a way to explain why your answer is true.

2) Twenty-five coins are in a 5 by 5 array. Suppose we have a jumping spider who tries to hop onto *every* coin *exactly* once, at each stage moving only to an adjacent coin in the same row or column. Is this possible regardless of which coin the spider starts on? You must find a way to explain why your answer is true.

3) Take any two numbers that sum to one.

- Square the larger and add the smaller.
- Square the smaller and add the larger.

Which of the above quantities will be largest? You must find a way to explain why your answer is true.

4) Consider a large cube made up of n^3 smaller cubes. If the large cube is painted completely on the outside, how many of the small cubes are painted on: 6 sides, 5 sides, 4 sides, 3 sides, 2 sides, 1 side, and 0 sides? You must find a way to explain why your answer is true.