Radical Pi presents:

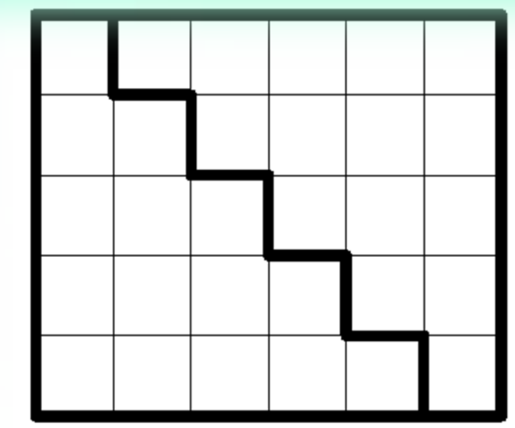
Farmer Ted Goes Natural

by Dr. Charles Baker

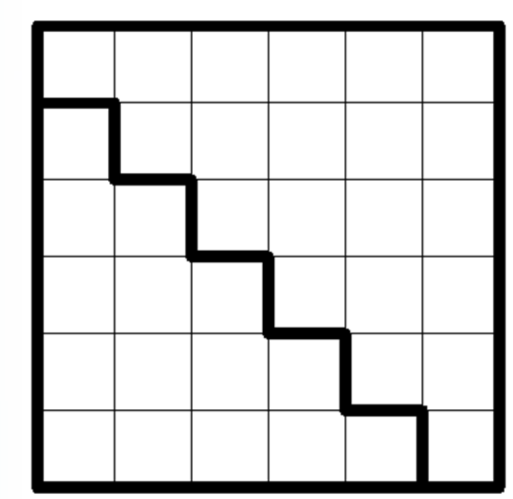
We all know the problem from calculus of minimizing the perimeter of a rectangle given a fixed area; so if the area is 190 square meters, the optimal perimeter is 4 * √(190) square meters. But have you ever actually tried to order √(190) square meters of fencing?

Following the eponymous paper by Prof. G. Martin (then U. Toronto, now U. British Columbia), we investigate the optimization among rectangles of integer length, but -- to make it more interesting than "factorize the number and take the 'closest-to-square' factorization" -- allow the area to dip below the given value if it gives us a better area-to-perimeter ratio.

We call the integers representing areas with perimeters giving the best area-to-semiperimeter ratio "almost-squares," and derive a) which integers are almost-squares, b) the first two terms of the asymptotic for the counting-function for the almost-squares, and c) the existence of algorithms for computing both "Is this number an almost-square" and "Count the number of almost-squares up to this number" in polynomial time, time permitting.



$$m(m-1) = t_m + t_m$$



$$m^2 = t_m + t_{m+1}$$

Thursday, Feb. 25th, 5:15 PM

Undergraduate Math Study Space (MA 052)

Free Pizza