

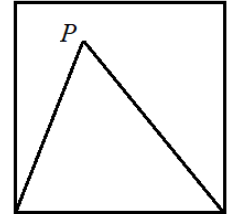
MAKO Puzzles, 2023

A Perfect Square

Find the smallest perfect square that begins with the digits 2023. $20232004 = 4498^2$

Geometric Probability

A point P is chosen at random in the interior of a square. Consider the triangle whose vertices are P and the two corners on the base of the square. What is the probability that this triangle is acute?



$$1 - \pi/4$$

Complete the “Nice” Grid

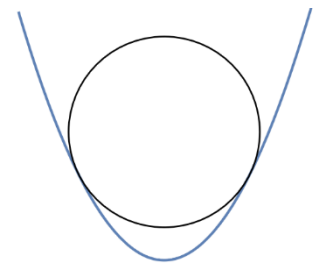
An $n \times n$ grid consisting of the integers $1, 2, \dots, n^2$ is said to be “nice” if every entry except 1 and 2 can be written as the sum of two distinct numbers from adjacent squares (two squares are adjacent if they share an edge or a vertex). Complete the following nice grid:

19	11	15	20	21
13	6	5	4	17
23	7	1	3	14
16	9	8	2	12
25	24	18	10	22

Circle in a Parabola

Find the radius of the smallest circle that can be inscribed in the parabola $y = x^2$.

$$r = 1/2$$



Evaluate the Integral

This problem is from the Missouri MAA Collegiate Competition.

Evaluate the integral $\int_1^\infty \frac{dx}{e^{x+1} + e^{3-x}} \cdot \pi/(4e^2)$