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by parmenides51

1 Georg writes the numbers from 1 to 15 on different pieces of paper.
He attempts to sort these pieces of paper into two stacks so that none of the stacks contains two numbers whose sum is a square number.Prove that this is impossible.
(The square numbers are the numbers $0 = 0^2$, $1 = 1^2$, $4 = 2^2$, $9 = 3^2$ etc.)

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2 In the octagon below all sides have the length 1 and all angles are equal.
Determine the distance between the corners A and B.
https://1.bp.blogspot.com/-i6TAFDvcQ8w/XzXCRhnV_kI/AAAAAAAAMVw/rKrQMfPYYJIaCwl8hhdVHdqO4f
s0/2011%2BMogh%2Bp2.png

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3 Determine all the ways in which the fraction $\frac{1}{11}$ can be written as $\frac{1}{n} + \frac{1}{m}$, where n and m are two different positive integers.

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4 A function f is given by $f(x) = x^2 - 2x$.
Prove that there exists a number a which satisfies $f(f(a)) = a$ without satisfying $f(a) = a$.

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5 Determine all sets (a, b, c) of positive integers where one obtains b^2 by removing the last digit in c^2 and one obtains a^2 by removing the last digit in b^2.
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