Flanders Math Olympiad 1998

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by Peter, parmenides51

1 Prove there exist positive integers a,b,c for which $a+b+c=1998$, the gcd is maximized, and $0<a<b\leq c<2a$.
Find those numbers.
Are they unique?

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2 Given a cube with edges of length 1, e the midpoint of $[bc]$, and m midpoint of the face cdc_1d_1, as on the figure.
Find the area of intersection of the cube with the plane through the points a, m, e.
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s400/1998%2Bflandres%2Bp2.png

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3 a magical 3×3 square is a 3×3 matrix containing all number from 1 to 9, and of which the sum of every row, every column, every diagonal, are all equal.

Determine all magical 3×3 square

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4 A billiard table. (see picture)
A white ball is on p_1 and a red ball is on p_2.
The white ball is shot towards the red ball as shown on the pic, hitting 3 sides first.
Find the minimal distance the ball must travel.
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s400/1998%2Bflandres%2Bp4.png
