

# Junior Balkan MO 2001

Nicosia, Cyprus

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- [1] Solve the equation  $a^3 + b^3 + c^3 = 2001$  in positive integers.

*Mircea Becheanu, Romania*

- [2] Let  $ABC$  be a triangle with  $\angle C = 90^\circ$  and  $CA \neq CB$ . Let  $CH$  be an altitude and  $CL$  be an interior angle bisector. Show that for  $X \neq C$  on the line  $CL$ , we have  $\angle XAC \neq \angle XBC$ . Also show that for  $Y \neq C$  on the line  $CH$  we have  $\angle YAC \neq \angle YBC$ .

*Bulgaria*

- [3] Let  $ABC$  be an equilateral triangle and  $D, E$  points on the sides  $[AB]$  and  $[AC]$  respectively. If  $DF, EF$  (with  $F \in AE, G \in AD$ ) are the interior angle bisectors of the angles of the triangle  $ADE$ , prove that the sum of the areas of the triangles  $DEF$  and  $DEG$  is at most equal with the area of the triangle  $ABC$ . When does the equality hold?

*Greece*

- [4] Let  $N$  be a convex polygon with 1415 vertices and perimeter 2001. Prove that we can find 3 vertices of  $N$  which form a triangle of area smaller than 1.