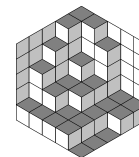


Day 1

- 1 Do there exist a sequence a_1, a_2, a_3, \dots of real numbers and a non-constant polynomial $P(x)$ such that $a_m + a_n = P(mn)$ for every positive integral m and n ?
- 2 In the plane are given 100 lines such that no 2 are parallel and no 3 meet in a point. The intersection points are marked. Then all the lines and k of the marked points are erased. Given the remained points of intersection for what max k one can reconstruct the lines?
- 3 An acute triangle ABC is inscribed in a circle of radius 1 with centre O ; all the angles of ABC are greater than 45° . B_1 is the foot of perpendicular from B to CO , B_2 is the foot of perpendicular from B_1 to AC . Similarly, C_1 is the foot of perpendicular from C to BO , C_2 is the foot of perpendicular from C_1 to AB . The lines B_1B_2 and C_1C_2 intersect at A_3 . The points B_3 and C_3 are defined in the same way. Find the circumradius of triangle $A_3B_3C_3$.
- 4 There are many opposition societies in the city of N . Each society consists of 10 members. It is known that for every 2004 societies there is a person belonging at least to 11 of them. Prove that the government can arrest 2003 people so that at least one member of each society is arrested.



Day 2

- 2 The incircle of triangle ABC touches its sides AB and BC at points P and Q . The line PQ meets the circumcircle of triangle ABC at points X and Y . Find $\angle XBY$ if $\angle ABC = 90^\circ$.
- 3 Zeroes and ones are arranged in all the squares of $n \times n$ table. All the squares of the left column are filled by ones, and the sum of numbers in every figure of the form `[asy]size(50); draw((2,1)-(0,1)-(0,2)-(2,2)-(2,0)-(1,0)-(1,2));[/asy]` (consisting of a square and its neighbours from left and from below) is even. Prove that no two rows of the table are identical.
- 4 m and n are positive integers such that $m \mid n^n - 1$ and the numbers $m+1, m+2, \dots, m+n$ are composite numbers. Prove that $m \mid n$ for all i between 1 and n . : D