# Kürschák Mathematical Competition 1985

1. Writing down the first 4 rows of the Pascal triangle in the usual way and then adding up the numbers in vertical columns, we obtain 7 numbers as shown below. If the same is done with the first 1024 rows of the Pascal triangle, how many of the 2047 numbers thus obtained will be odd?

$$\begin{array}{ccccccc} & & & 1 & & & \\ & & 1 & & 1 & & \\ & 1 & & 2 & & 1 & \\ 1 & & 3 & & 3 & & 1 \\ \hline 1 & 1 & 4 & 3 & 4 & 1 & 1 \end{array}$$

2. Let $A_1B_1A_2, B_1A_2B_2, A_2B_2A_3, \dots, B_{13}A_{14}B_{14}$, $A_{14}B_{14}A_1$ and $B_{14}A_1B_1$ be equilateral rigid plates that can be folded along the edges $A_1B_1, B_1A_2, \dots, A_{14}B_{14}$ and $B_{14}A_1$ respectively. Can they be folded so that all 28 plates lie in the same plane?

3. Given are $n$ integers, not necessarily distinct, and two positive integers $p$ and $q$. If the $n$ numbers are not all distinct, choose two equal ones. Add $p$ to one of them and subtract $q$ from the other. If there are still equal ones among the $n$ numbers, repeat this procedure. Prove that after a finite number of steps all $n$ numbers will be distinct.



www.imomath.com

The IMO Compendium Group,
D. Djukić, V. Janković, I. Matić, N. Petrović
Typed in LaTeX by Ercole Suppa
www.imomath.com