Eötvös Mathematical Competition 1904

1. Prove that if an inscribed pentagon has equal angles then its sides are equal.

2. If a is a natural number, show that the number of positive integral solutions of the equation

$$x_1 + 2x_2 + 3x_3 + \cdots + nx_n = a \tag{1}$$

is equal to the number of non-negative integral solutions of

$$y_1 + 2y_2 + 3y_3 + \cdots + ny_n = a - \frac{n(n+1)}{2} \tag{2}$$

3. Let A_1A_2 and B_1B_2 be the diagonals and O be the center of a rectangle. Find and construct the set of all points P that satisfy simultaneously the four inequalities

$$A_1P > OP, \quad A_2P > OP, \quad B_1P > OP, \quad B_2P > OP.$$

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