# ROMANIAN MATHEMATICAL OLYMPIAD
# FINAL ROUND - 1986

## X$^{\text{th}}$ FORM

1. Solve the equation: $8^x + 27^x + 64^x + 125^x = 24^x + 30^x + 40^x + 60^x$.

2. Let $P$ be a point in the triangle $\Delta ABC$ and $x, y, z$ the distances from $P$ to $A, B, C$ and $p, q, r$ the distances from $P$ to $[BC], [AC], [AB]$. Prove that: $xyz \geq (p+q)(q+r)(r+p)$.

3. Let $A$ be a subset of $\mathbf{C}$ so that:

   (a) $A$ contains every complex number $z$ so that $|z| = 1$.

   (b) For every $z_1, z_2 \in A$ we have that $z_1 + z_2 \in A$.

   Prove that $A = \mathbf{C}$.

4. Solve the equation: $4a^2 \sin(x + B) \sin(x + C) = (b + c)^2 + 2bc$, where $a, b, c$ are the lengths of the sides and $B, C$ are the angles of a rightangled triangle.