People's Democratic Republic of Algeria
Ministry of National Education
Directorate of Specialized Education and Private Education
National Committee of Olympiads of Educational Disciplines

Algerian Mathematical Olympiad - Second Edition 2025

Category: Junior **July 3rd, 2025**

Problem 1. Find all functions $f : \mathbb{R} \to \mathbb{R}$ such that:

$$f(f(2x + y)) + f(x) = 2x + f(x + y)$$

For all real numbers $x, y \in \mathbb{R}$

Problem 2. Let ABC be a triangle such that $\angle ABC = 3\angle ACB$. In the circumcircle of this triangle, let D, E and F be points such that:
$(AD) \parallel (BC)$, $(DE) \parallel (CA)$ and $(EF) \parallel (AB)$.
Let J be the intersection of (DF) and (AC) and let ω be the circle that passes through J and is tangent to (BD) at D. Finally, let L be the intersection point of ω and (ABC). Prove that points E, J and L are collinear.

Problem 6. Let $a_0, a_1, \ldots, a_n$ be positive divisors of the number 2024^{2025} such that

- $a_0 < a_1 < a_2 \cdots < a_n$
- $a_0 \mid a_1, a_1 \mid a_2, \ldots, a_{n-1} \mid a_n$

Find the largest possible value of the positive integer n.